

COAL AGE

A McGRAW-HILL PUBLICATION

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"
Published by McGraw-Hill Publishing Company, Inc.
H. W. CLARKE, Vice-President

JULY 1939

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Coal helps grow food at this Ohio plant (p. 41)

● **Starting with 6-ton tractor-trailer units** about seven years ago, the Sinclair stripping organization has steadily built up the capacity of its transportation units until it now has in service an 80-ton semi-trailer pulled by a two-engined butane-electric tractor. The organization's experience with this largest-to-date haulage unit, and also with the new butane fuel, will be detailed in an article on Sinclair haulage practices scheduled for the August issue.

● **What the public does not know** about the coal industry is pegged down in this issue for all to see. Both ignorance of the industry's problems and lack of appreciation for coal as a modern fuel are recorded by Vox Pop., clearly indicating the size and extent of the job coal has yet to do. The facts, uncovered by a sampling survey in various parts of the country for Coal Age, are presented in the story starting on p. 33.

● **Coal Age** in August will present the highlights of the meetings of the Rocky Mountain Coal Mining Institute at Salt Lake City and the Mining Society of Nova Scotia at Pictou. Syd Hale represented Coal Age at the Utah meeting and R. Dawson Hall in Canada. Their reports will bring Coal Age readers the essence of the formal papers on problems affecting coal mining and preparation, as well as the round-table discussions on the subjects presented. Look for them next issue.

● **Alabama, here we come!** Conveyor practice at the Dolomite mine of the Woodward Iron Co. is described in this issue, p. 35, while the August Coal Age will tell the story of how changing from wide rooms and thin pillars to a panel-and-block system saved an additional 35 per cent in coal recovery at the Mulga mine. Good meat for coal-mining men faced with the problems of speeding development and increasing recovery.

● **Solving its rock-disposal problem** for the next thirty years, the Glen Alden Coal Co. has supplemented its Huber preparation plant with an aerial tramway capable of handling breaker and mine waste at a rate of 125 tons per hour. The story of this installation and how it fits in with the Huber modernization program is scheduled for an early issue of Coal Age.

● **How conveyors** are applied to mining a thick, heavily pitching seam at the Brilliant mine of the Kemmerer Coal Co., in Wyoming, is the subject of the article on p. 51 of this issue. Next month, Glenn Sorenson, Kemmerer general superintendent, and Ivan Given, of Coal Age, will follow up with a description of the plant erected to prepare coal from this operation for market. Its unusual features will repay study.

COAL AGE is published monthly on the 1st. \$3 per year in the United States, Canada, Mexico, Central and South America; other countries, \$5 or 20 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable address: "McGrawhill, N. Y." Member A.B.P. Member A.B.C.
Contents Copyright 1939 by

McGRAW-HILL PUBLISHING COMPANY, INC.

JAMES H. MCGRAW, Founder and Honorary Chairman

Publication Office, 99-129 North Broadway, Albany, N. Y.

Editorial and Executive Offices, 330 West 42d St., New York, N. Y.

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COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL MINING INDUSTRY

SYDNEY A. HALE, *Editor*

July, 1939

Pertinent and Impertinent

• **INTERPRETATIVE BULLETIN 13** of the wage and hour division of the Department of labor offers a shining example of how an expression of good intentions ineptly worded can raise havoc. Paragraph 15 of that bulletin states that time spent in attending meetings and lectures sponsored by the employer and related to the employee's work shall be considered time worked. Among the examples was meetings on mine-rescue work. Told by the National Coal Association and other groups interested in accident prevention that this paragraph would badly stymie the promotion of safety, the division explained that it did not intend to include safety meetings in the hours-worked category, and mine-rescue instruction only when such instruction made the team member a professional in that work, subject to call by his company or others.

• **WHEN** economic discussions become wrapped up in emotions, it is sometimes difficult to determine where principle ends and prejudices begin.

• **WHAT DOES** John Q. Public think of the coal industry? Very little, and much of that little wrong, if the survey of public opinion which appears elsewhere in this issue of *Coal Age* is any criterion of consumer reactions. A majority of the coal-burning consumers interviewed would prefer oil or gas if they had a free choice. Many of them haven't the slightest idea where the coal they

use comes from: some who think they know are in error; a number—to cite just one example—think Pocahontas a product of Pennsylvania. When such queer dis-



tortions appear in the slides John Q. puts under his private microscope, it is high time the industry did more than just talk about the desirability of "educating" the consumer.

• **SOME FOLKS** who pride themselves on their hard-headedness are merely thick-skulled.

• **ANTHRACITE** and bituminous coals have so long been regarded as separate entities that it sounds heretical to challenge this ancient conception. And yet, if these two great divisions of mining could forget their superficial differences and join hands with

coke, what an aggressive battle the solid-fuel industry could wage against competition! Why not try it? Stranger unions than this have succeeded.

• **THE ONLY TROUBLE** with some of the Homes of Tomorrow at the New York World's Fair is that they seem to be designed to burn the fuels of yesterday—and we don't mean coal.

• **CONGRATULATIONS** to Anthracite Industries, Inc., on its establishment of a dealer training course covering the installation, operation and servicing of domestic stokers. This new venture should effectively supplement the older excellent courses on retail servicing and merchandising. Psychologically even more important is the recognition this step gives to the present position and still greater possibilities of automatic heating in the hard-coal field. Though some producers may continue to grouse about the loss of tonnage in the larger sizes, this move definitely places the industry as a whole behind coal's most powerful ally in the fight to hold the domestic consumer.

• **HOW DOMESTIC STOKERS** are influencing sizing and preparation trends was vividly highlighted by Barton R. Gebhart, Chicago, Wilmington & Franklin Coal Co., at the recent annual meeting of the Stoker Manufacturers' Association. In four years the percentage of sizes passing through a 2-inch round-hole screen sold in southern Illinois has increased from 56 to 65 per cent. The percentage

of all sizes sold given dedusting or other special treatment has jumped from 9 to approximately 30 per cent. C. W. & F., added Mr. Gebhart, has increased its sales of premium small stoker coal close to 100 per cent every year for the past five—"and I don't believe this experience is unique." The stoker is certainly going to town and progressive producers of domestic coals are traveling with it.

A Dry Solution

FOR THOSE STATES where sealing of abandoned workings is not permitted there may be a solution, perhaps only partial, of the effluent problem of the mine. To be oxidized, pyrite needs both oxygen and water; how large a concentration of each, no one appears to know. Will one or five per cent of oxygen in the atmosphere suffice for oxidation; will 50 or 100 per cent of air saturation provide the needed reaction water?

However, if the flowing and standing water can be kept everywhere in its place, the acidification of the water—if not of the mine—will be prevented. As the air is nowhere supersaturated except at the mine entrance, the progress of oxidation of pyrite might be expected to be slow and, as no actual water will pass over the oxidized pyrite to dissolve the ferrous sulphate formed, the mineral will soon have its exposed surfaces more or less covered.

Hence, if a mine were kept dry or if ebb and flow of its several sumps and natural impounded areas could be prevented, there would be no marked water acidification. Where there is air but no water, as above the sump or in a dry mine, there is reduced acidification; where there is water but no air, as below the water of a sump or stream, the water does not acidify. However, the floor in a dry mine may heave from pyrite oxidation, for the moisture and oxygen in the air may turn the trick.

Present ebb-and-flow conditions in the mines can be improved greatly. But with the inflows

from the surface so irregular, as they must ever be, it is difficult to provide pump facilities for the prompt removal of the water. Nevertheless, it might be profitable to do so. The coal industry eventually may watch its water levels as closely in its mines as in its boilers.

Just "No"?

PRODUCERS and State mining departments are up in arms against the Neely-Keller Federal inspection bill recently introduced in Congress. The opposition is understandable and justifiable. Drawn in terms both broad and vague, the proposals of the West Virginia Senator and Illinois Representative would authorize the creation of another government bureau. At best such a bureau could only duplicate work now being done; at worst, the bureau might set itself up as dictator of how mines should be operated and destroy the effectiveness of the work of State departments and coal companies.

That the bill is vicious in its vagueness is clear from even a casual reading. Whether the industry can afford to pursue a policy of simple opposition without alternative proposals of its own, however, may be debatable. Too often in the past uncompromising opposition of this type has been twisted into claims that the opposition was an attack upon wholly desirable objectives. Here, too, proponents of the Neely-Keller bill might charge that opposition to it was opposition to measures designed to improve the safety of mining operations.

Such a charge, fortunately, could be exploded by very simple counterproposals by the industry clarifying the responsibilities of the U. S. Bureau of Mines. Such counterproposals would do three things: make certain that the knowledge and trained personnel of the Bureau would be employed; block the creation of another tax-eating bureau at Washington; convince the public that the industry is just as eager—if not more—to promote safety as the proponents of the Neely-Keller monstrosity.

In no sense, however, should such counterproposals contemplate limiting or interference with State laws or the powers and activities of State mining departments. On the contrary, every effort should be made to strengthen the work of State inspectors, particularly those periodic inspections so helpful in eliminating hazards and bad practices. There should be no Federal interference with such work.

Risk of Bad Laws

BECAUSE years ago some operators were careless about ventilation, several States enacted laws that required crosscuts to be made no farther than 50 or 60 ft. apart. For decades this provision increased cost of heading driving and crosscut stopping, wasted air, and weakened roof and pillars. Pillars were narrowed to reduce the aggregate length of crosscuts.

Then came mechanization to reshuffle conditions, making frequent cross-cutting less expensive and quite desirable, and wider heading pillars possible. Hence, the additional costs for ventilation and timbering, if incurred, were more than balanced by increased convenience. Because of the shorter life of headings, however, these additional costs were few and far smaller than before. When methane appeared in quantity, frequently cross-cutting also reduced the length of line brattices and increased safety.

But it is hardly good management to wait for a new technique in mining to make legislation acceptable. Thus it behooves companies to avoid practices which may cause legislation that will be harmful to both operators and miners and prevent progress. Silicosis and its kindred diseases, avoidable accidents from mechanization and inadequately guarded electrical equipment are cases in point in this connection. It is better to play safe and forestall undesirable laws by providing nothing against which legislation justifiably can be demanded. A little carelessness, and the industry may be saddled with laws for which later no excuse can be found.

JOHN Q. PUBLIC ANSWERS

+ Nineteen Questions on Coal

By DICKSON HARTWELL

*Hartwell, Jobson & Kibbee
Public-Relations Counsellors*

What does John Q. Public—the mythical man of the streets who is a nightmare to Congressmen seeking reelection and periodically sweeps out national and local political administrations—think of the coal industry and its problems? Operators and retailers may lie awake nights wondering how to hold their markets, producers may praise or damn federal regulation and look askance at demands of organized labor. But John Q. Public and his brethren, the “people” who can exercise a big voice in the solution of these problems, are either ignorant, prejudiced, grossly misinformed or apathetic about all of them.

JUST how widespread public ignorance is on many major problems of the coal industry is revealed by a national survey of opinion recently made for *Coal Age* by the research division of Hartwell, Jobson & Kibbee. Only one person in twenty, this survey shows, knows what the Guffey act is and only one in four has ever heard of it. Although 62 per cent of the people interviewed were using coal in their own homes, the majority would prefer to burn oil or gas. And despite the fact that coal had been headline news almost daily for two months when the survey was made, even with special prompting four out of five people couldn't recall having read anything favorable about the industry.

Interview Sampling Used

The survey was conducted by the sampling method made familiar in the Gallup polls. People in all walks of life were personally interviewed. The figures given in later paragraphs reflect within 5 per cent the state

of mind of the regions studied. These regions were the Middle Atlantic and New England States, Ohio, Wisconsin and Colorado. Nineteen specific questions were asked.

1. *What fuel is burned in heating your home?* Sixty-two per cent of the people interviewed said “coal”; 27 per cent, oil; 9.5 per cent, gas, and 1.4 per cent, wood. In Colorado, 90 per cent of those interviewed burned coal; in suburban New York, 60 per cent were using oil.



2. *If you were building a new home, what fuel would you prefer to use?* Forty-two per cent favored oil; 28 per cent, coal; 27 per cent, gas; 3 per cent, other fuels.

Analysis of the replies to this question showed that only 40 per cent of the consumers now using coal would continue to do so if they had a choice; 32 per cent of the coal-consuming group preferred oil and 22 per cent gas. Nine per cent of the oil users would prefer coal and 17 per cent gas. No present gas consumer would shift to coal and only 5 per cent of the gas group favored oil. Scranton was the only area surveyed that was entirely loyal to coal.

3. *Why would you prefer the fuel indicated?* Answers to this question, with many people giving two or three reasons for their preference, showed the following:

Reason	Coal Per Cent	Oil Per Cent	Gas Per Cent
Economical	60	19	29
Convenient	7	61	50
Clean	12	57	51
Even heat	12	8	9
Dependable	5	1	2

Coal's greatest appeal is economy; in areas where transportation costs make the retail price high, preference for oil is most strongly marked. Patently these answers show that the industry must push automatic heating and dustproofed deliveries if coal is to secure higher convenience and cleanliness ratings.

4. *Whom do you turn to for advice on heating problems?* Tabulation of answers to this question on a percentage basis revealed:

Source of Advice	Coal Per Cent	Oil Per Cent	Gas Per Cent
Equipment dealer.....	17	13	10
Fuel dealer.....	16	23	40
Plumber.....	14	14	..
Technician.....	8	21	15
Others.....	11	7	10
No one or don't know	34	21	25

In a highly competitive market the first rule for successful selling is service. The fuel dealer who is called in for advice on heating problems undoubtedly has the confidence of his customers and the inside track on sales. While this tabulation would seem to indicate that the average coal consumer was more ignorant of where to turn for advice than consumers of oil and gas, the relative normally trouble-free operation with the different fuels may have a bearing on the situation.

5. *What is the Guffey act?* Only 5 per cent of the people interviewed could give a correct or adequate description of the statute; 22 per cent knew that “it had something to do with coal,” while 73 per cent confessed complete ignorance.

6. *What news do you recall read-*

ing about the coal industry? As the survey was conducted immediately after the settlement of the bituminous suspension in May, it was expected that strikes would lead the news. They did—to the tune of 77 per cent. Seven per cent of those interviewed recalled reading about “the miners’ poor conditions”; 1 per cent, the New York conference; 3 per cent, Bill No. 1221; 17 per cent, nothing, and 3 per cent about “other” aspects such as company stores, accidents, low wages, lockouts.

7. Do you recall reading anything favorable about the industry? Survey technicians call this a “weighted” question—designed in this case to produce a preponderance of replies showing favorable news. Results, however, showed no such preponderance, as only 20 per cent recalled reading anything favorable; 79 per cent answered “no” and 1 per cent said they didn’t know.

8. Who do you think was most at fault in the disagreement between the miners and operators? Twenty-eight per cent of those interviewed put the blame on the mine owners, 19 per cent on the miners, 11 per cent on both, 25 per cent on unions, 4 per cent on President Roosevelt, 0.5 per cent on the railroads and 12 per cent said they didn’t know.

This also was a weighted question—this time to limit the choice to either miner or operator. Any other choice may be set down as evidence of a strong conviction on the part of the person interviewed. One out of four, it will be noted, placed the onus on the unions. If “unions” and “miners” are lumped together as labor, it would appear that the sympathies of the fuel-consuming public are not so strongly with labor as is popularly believed. Eight people out of nine blamed “some one,” so the public is alive to the issue.

Differ Widely on Hours

9. How many hours a day does a miner work? One per cent of those answering this question said 4 hours per day; 1 per cent, 5 hours; two 8 per cent groups, 6 and 7 hours, respectively; 36 per cent, 8 hours; 4 per cent, 9 hours; 13 per cent, 10 hours; 1 per cent, 11 hours; 4 per cent, 12 hours; 1 per cent each, 13, 14 hours, respectively; $\frac{1}{2}$ per cent, 17 hours, and 19 per cent “long hours.” The widest range in guessing occurred in suburban New York, Maryland and Wisconsin. Eighty-two per cent of those responding apparently were ignorant of the existence of the standard 7-hour day in coal mining.

10. Are miners’ wages fair, too high or too low? Forty per cent of those interviewed thought present wages fair; 3 per cent, too high; 47 per cent, too low, and 10 per cent said they didn’t know. More than half the consumers interviewed in Colorado and the Pennsylvania anthracite region believed wages are fair. In the higher-income groups for all territories, the number thinking wages fair was about the same as those who feel they are too low.

11. Are mine owners’ profits fair, too large or too small? Operators’ assertions that they are losing money have not registered with John Q. Public. Forty-one per cent of those interviewed said these profits were fair; 31 per cent, too large; 12 per cent, too small, while 16 per cent pled ignorance of the subject. Among the higher-income groups there was a slight increase in the number who believed profits are either fair or too small.

Mine Owners Not Known

12. Whom do you consider the leading coal-mine owner today? This question was passed up by 73 per cent of those interviewed; 27 per cent were able to name an individual or company. Not one man or company, however, was named in as many as three sections of the country and only three rated mention in two sections.

13. Are the owners voluntarily taking steps to improve working and living conditions of the miners? Fifty-three per cent of those interviewed answered affirmatively, 31 per cent said “no” and 16 per cent had no opinion on the subject. In the higher-income groups, 60 per cent of those interviewed believed that the operators were taking such steps.

14. Should the operators take such steps voluntarily? There is no doubt of public opinion on this point; 96 per cent of those interviewed answered “yes,” only 2 per cent said no, while 2 per cent had no opinion.

15. Where have you seen coal advertised? Replies to this question break down as follows: Newspapers, 64 per cent; radio, 26 per cent; magazines, 17 per cent; billboards, 45 per cent; circulars, 15 per cent; miscellaneous, 7 per cent; “don’t know,” 6 per cent. Newspapers were most frequently mentioned in most sections, but billboards lead in Colorado and the radio seems most effective in Wisconsin.

16. What brands of coal do you know by name? Eighty-five per cent of those interviewed were able to name a brand; 15 per cent could not.

The 85-per centers named 78 brands or companies. Pocahontas led with mentions in six of the seven regions covered. “Blue coal” is well-known throughout the East except in Scranton; Lehigh was mentioned in all four Eastern areas.

17. Where do these coals come from? Only 65 per cent of those interviewed could name a source; 27 per cent of these answers were incorrect.

Only One-Third Get Service

18. What service does your coal dealer give you besides selling you coal? Advice, answered 9 per cent; cleans furnace, 12 per cent; delivery, 9 per cent; inspection, 2 per cent; sprays bin, 5 per cent; miscellaneous services, 5 per cent; none, 57 per cent. Only one-third of the coal consumers interviewed receive any service from their dealer outside of delivery, which is hardly “service” in the modern merchandising sense.

19. Which takes the largest share of the consumer’s coal dollar—mine labor, transportation, taxes of all kinds, profits of all kinds? Answers on a percentage basis show:

	Labor	Transportation	Profits	Taxes
Placed first	36.7	25.6	25.6	12.1
Placed second	26.1	28.1	24.1	21.6
Placed third	18.6	24.6	23.1	33.7
Placed last	18.6	21.6	27.1	32.7

While the differences in ratings are small, only one person out of four interviewed stated that the transportation companies receive the largest share of the consumer’s coal dollar. One out of two puts profits in first or second place and 26 per cent believe that profits consume most of the money spent for coal. Apparently, however, John Q. Public has no strong convictions on how his coal dollar is split, as the margin of difference in rating between labor, most often listed as absorbing the largest share, and taxes, most often considered to take the smallest cut, is not great.

Certain sectional differences are interesting. In Massachusetts, for example, the consensus of opinion is that profits come first, transportation second, labor third and taxes last. Wisconsin believes that profits and transportation absorb about equal parts of the coal dollar with taxes third and labor fourth. Ohio and Pennsylvania anthracite region, the order of absorption is: Labor first, profits the second largest share, taxes third and transportation fourth.

This is what the public thinks about the coal industry. Fortunately for the industry, public opinion can be changed.

CONVEYOR MINING

+ Six Headings Abreast in Gassy Territory

To Open New Section in Dolomite Mine

In driving a six-heading airway preliminary to developing a large territory for conveyor mining in Dolomite No. 3 mine of the Woodward Iron Co., Dolomite, Ala., a set-up of six heading conveyors, two cross conveyors and a mother conveyor is used to push the six headings simultaneously and abreast at the rate of 20 ft. per day, two-shift work. All items of machinery and cable connections inby of the loading point are permissible or explosion-tested and the cable connectors are padlocked. Water is used on cutter bars, conveyors are sprayed, and rock-dusting is done clear to the face. The mother conveyor is pulled forward 300 ft. without dismantling pans. All headings are protected with timbers treated by the Os-mose process.

DOLomite No. 3 mine is situated in Jefferson County 8 miles west of the business district of Birmingham. It is an

old mine and for the most part the early workings were in coal 6 ft. thick which included a 6- to 7-in. parting situated 2½ ft. below the top. Continued development revealed a thicker parting and in the Hueytown section of the mine, which is now being developed for conveyor work, mining was stopped some years ago when a still thicker parting practically cut out the top coal and the bottom 4½-ft. bench showed a consistent 9- to 10-in. band of rock 14 in. from the bottom. The seam lies practically level and liberates considerable methane. This Hueytown conveyor section is 4 miles by main haul from the slope bottom and lies under 350 to 400 ft. of cover.

Observations of successes with conveyor mining had convinced officials of the company that this Hueytown section could be mined profitably by that method and it was decided to drive an eight-heading entry two miles to the boundary and mine on full retreat (see left-hand side of mine drawing, Fig. 1). The first step, now under way, and comple-

tion of which is expected in August or September, depending upon running time, is to provide adequate and efficient ventilation by driving a six-heading airway 3,000 ft. from the main entry to connect with old workings near an air slope. Heavy lines of Fig. 1 indicate the work that has been done with conveyors on this project.

Arrangement of conveyors for driving the six headings simultaneously is shown in Fig. 2. The 300-ft. mother chain conveyor on heading No. 3 is a LaDel Model FW with 15-hp. permissible drive. It discharges to a Jeffrey 61EW elevator with 5-hp. open-type drive and Cutler-Hammer open-type automatic control. All motors and controls inby of this elevator are permissible or explosion-tested. A chain cross conveyor 115 ft. long (with pans purchased for 300-ft. ultimate work in rooms) situated on the left and serving headings No. 1 and No. 2 is a 10-hp. Jeffrey Type 61AM. The chain cross conveyor on the right serving headings 4, 5 and 6,

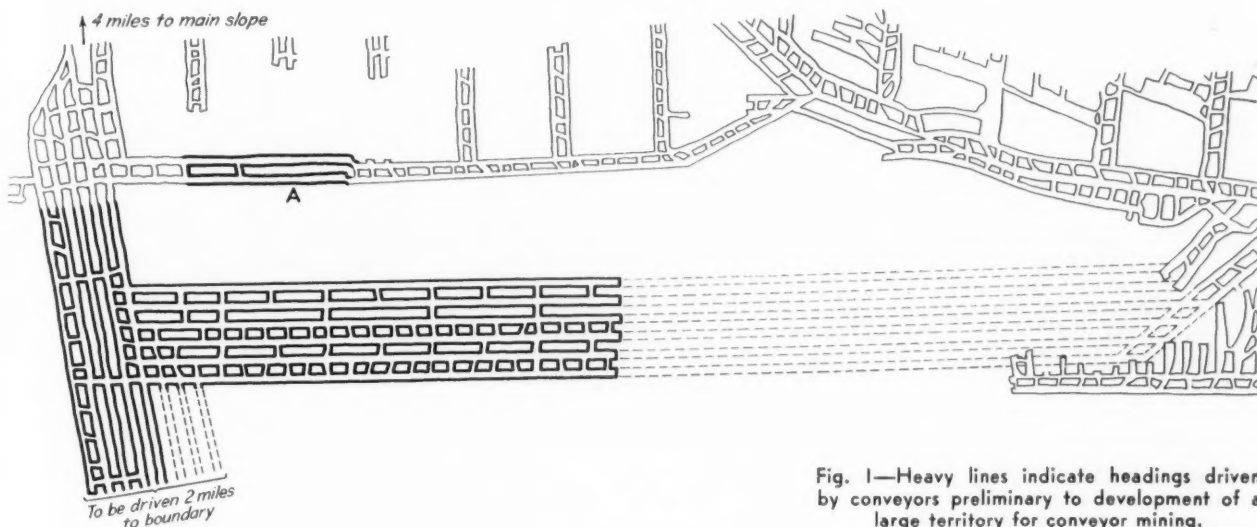


Fig. 1—Heavy lines indicate headings driven by conveyors preliminary to development of a large territory for conveyor mining.

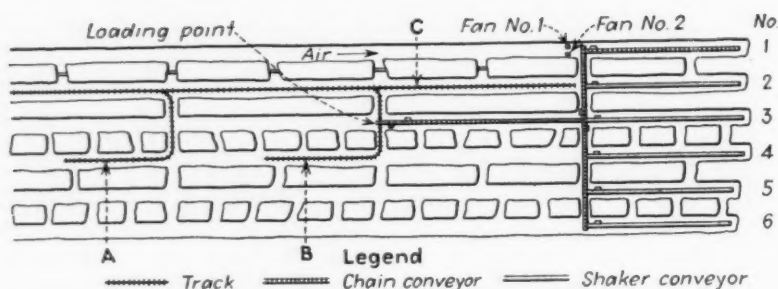


Fig. 2—The six headings of an airway are being driven abreast by conveyors which deliver to one point.

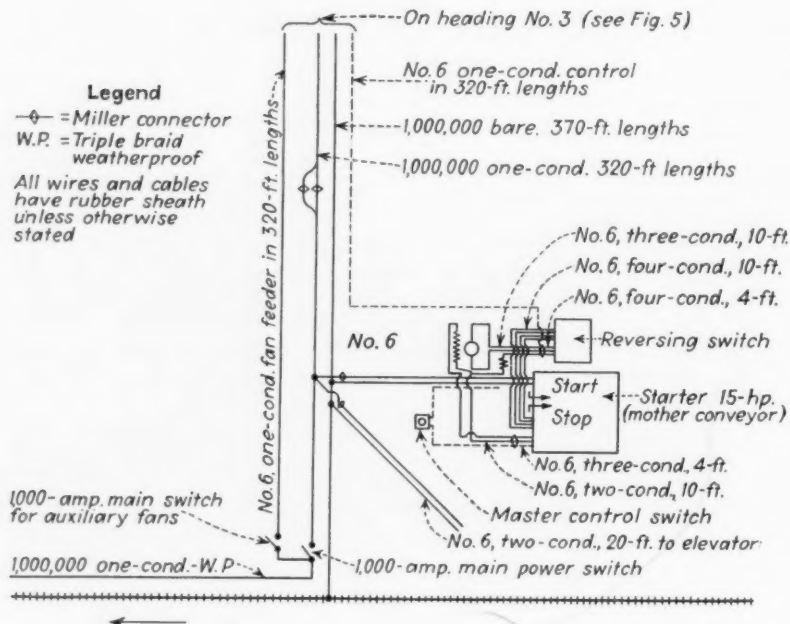


Fig. 3—Feeders and wiring arrangement at the loading point. A continuation, including cross conveyors and heading equipment, is shown in Fig. 5.

is a 166-ft. LaDel Model FA with 10-hp. drive. Heading No. 1 is served by a Jeffrey of the same drive and type as that of the left cross conveyor except that it includes pan equipment for extending to 350 ft. In headings 2, 3, 4, 5 and 6, shaker conveyors are used and these are 350-ft. Model U16 LaDels with 10-hp. drives. Outstanding electrical features of the motors, controls and wiring will be described later in the article. Direct current at 275 volts powers all conveyor section machinery.

Two Sullivan No. 10B Buddy type shortwall cutters are used in headings Nos. 1 and 2. These machines have 6-ft. thin-kerf bars. The other four headings are cut by four new Jeffrey Type 35-20S shortwalls with 7½-ft. standard kerf bars. Standard bits, roller sharpened and tipped with borod, are used on all of the cutters. These bits are not ground between sharpenings.

Faces are drilled with six Jeffrey 3-hp. Type A-7 permissible drills. Headings Nos. 1 and 2 are venti-

lated by Jeffrey centrifugal auxiliary fans situated in the fresh air on Heading No. 1 and discharging through Dupont 12-in. Anaconda-type Ventube to points within 20 ft. of the heading faces. Headings 3, 4, 5 and 6 are ventilated by line brattices.

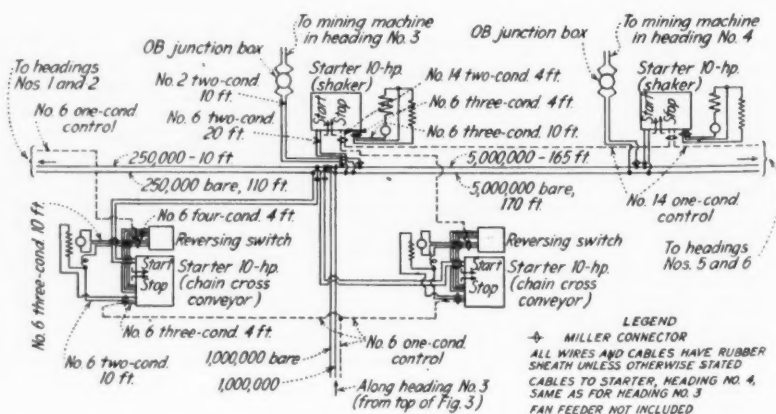


Fig. 5—Permissible or explosion-tested equipment, automatic single-wire sequence control and locked connectors with vulcanized joints are features of the electrical design.

Several extra precautions toward safety are taken with these fans. They operate 24 hours per day seven days a week and are fed by a separate positive wire tapped back of the main conveyor section switch at the loading point to a 1,000,000-circ. mil feeder which in turn is separate from the trolley-wire system (Fig. 3). Between shifts and during off shifts the main conveyor power switch (1,000-amp. Elreco quick-break type) is kept open, thus leaving only the fan feeder energized. Every seven hours during off shifts and over week-ends a pumper or fireboss visits the section to check the auxiliary fan operation and see that the main feeder switch is out. They report on the form shown in Fig. 4.

Headings are driven 18 ft. wide on 52-ft. centers and the crosscuts are 14 ft. wide. These latter are

A-71 WOODWARD IRON COMPANY

Electrical Equipment Inspection

WORKS

LOCATION _____ DATE _____

I have inspected fans, checking bearings for heat and find them to be _____

Are all other power switches except fan thrown _____

Are other general conditions good _____

Time of inspection _____

SIGNED _____

NOTED _____

Fig. 4—Auxiliary fans operate continuously and their inspections by a pumper or fireboss during off shifts and week-ends are reported on this form.

served by the shakers driven through LaDel 90-deg. swivels. Three men per heading (mining-machine operator and two loaders) do all of the cutting, bugdusting, drilling, shooting, loading, timbering, handling of supplies and conveyor extension. In addition to the eighteen face men, five other regular men are employed per shift: car trimmer, bratticeman and his helper, motor inspector and section foreman. The first shift

to move conveyors reduces the net over a long period.

At the loading point, trips of 21 cars each are handled by a new Sullivan 10-hp. single-drum hoist. Trips are serviced to this point by the following procedure: A trolley locomotive bringing a trip of empties pushes them onto track *A* (Fig. 2), then pulls the loads from track *B* and backs them onto track *C*. After returning for the empties which were left on track *A* and spotting them on track *B*, the loads are then hauled out of the section from track *C*. Mine-car loadings average 1.7 tons. Use of steel ties leaves ample height for haulage without brushing top. What brushing is necessary at the

loading point is done well ahead of the contemplated moving date.

With 300-ft. ropes attached to the drives and by making repeated 50-ft. hauls in a space near the end of the heading, mining machines pull the conveyor drives (with control equipment loaded on top) to the new positions. The pan and chain line of the mother conveyor on heading No. 3 (Fig. 2) is pulled forward 300 ft. without dismantling. Its drive is pulled by the same method except that a 600-ft. rope is required to reach the mining machine which is doing the pulling at the face of the heading.

Pans of the left-hand cross conveyor serving headings 1 and 2 are

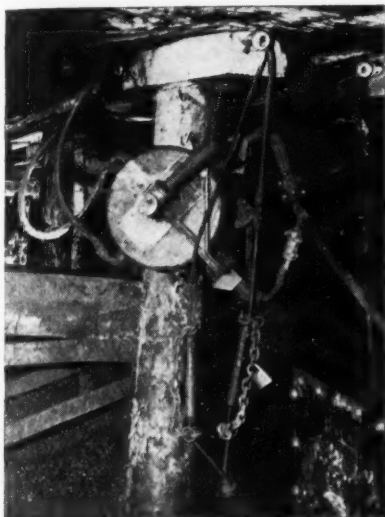


Fig. 6—Miller connectors are padlocked in a manner similar to these, which hang near the fused gas-tight mining-machine junction box.

works from 7:30 a.m. to 3:00 p.m. with $\frac{1}{2}$ hour out for lunch and the second shift from 5:00 p.m. to 12:30 a.m., also with $\frac{1}{2}$ hour out. There is no supply shift.

Using water on the chain during cutting has long been a standard practice in the Woodward mines. To hold down dust at the conveyor transfers and at the car-loading point, the heading conveyors, cross conveyors and mother conveyor are each fitted with an overhead water spray. Consistent with the anti-dust and electrical precautions, permissible explosive and closed lights are used.

All of the 9- to 10-in. parting material from the heading coal is gobbled along one side. The immediate roof is a frail, laminated slate 2 to 6 ft. thick. Above that lies 10 in. of coal which in turn is topped by strong thick sandstone. Permanent timbering is designed to hold the superficial roof of laminated slate and coal in place. As indicated in the first paragraph of this article, the airway advance is 10 ft. per shift, but the average is less because the time required to make crosseuts



Fig. 7—Looking outby on heading No. 3 at the two cross conveyors discharging onto the mother conveyor.



Fig. 8—Looking outby on heading No. 1; auxiliary fan at left and a permissible junction box on the timber in foreground. Even the box is covered with rock dust.

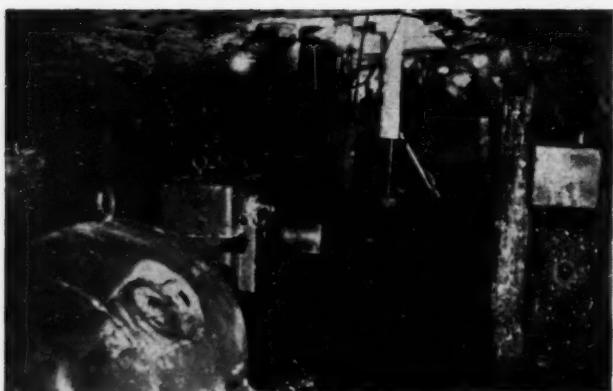


Fig. 9 (top, left)—Looking outby along mother conveyor at loading point. Discharge from mother to elevator and from elevator into cars is practically dustless because water is used on cutter bars and the coal is sprayed en route

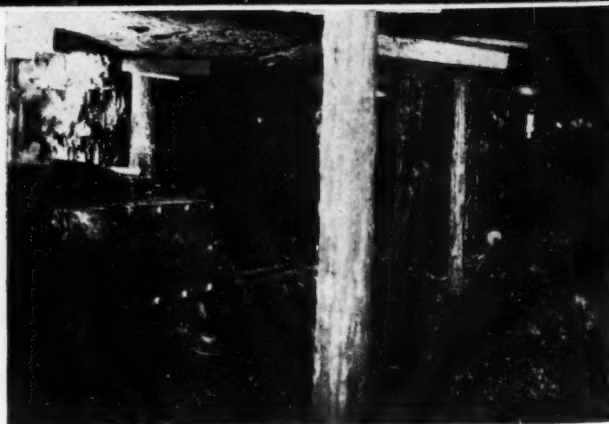
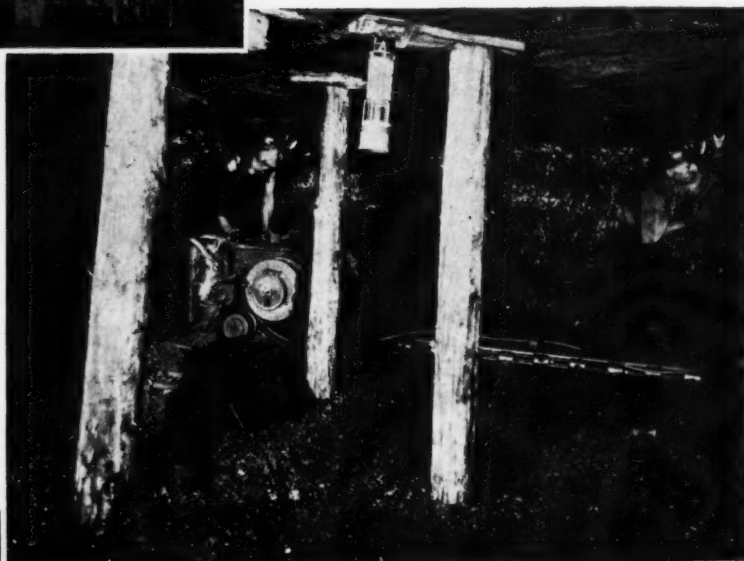
Fig. 10 (above)—Looking outby on cross heading to right at discharge of cross conveyor to left. Three explosion-tested control units are evident in this picture.

Fig. 11 (left)—Looking inby on heading No. 1. These permissible fans are powered by a separate positive feeder. The 12-in. flexible tubing at the right goes through a crosscut into heading No. 2.

Fig. 12 (right)—Thin-kerf shortwall cutter and a chain conveyor at the face of heading No. 1.

Fig. 13 (bottom, left)—Permissible thin-kerf shortwall, permissible electric drill and chain conveyor at face of heading No. 1.

Fig. 14 (bottom, right)—Standard-kerf permissible shortwall and shaker conveyor at face of heading No. 3. All timbers in these headings of the conveyor-driven airway are treated local pine.



dismantled and moved forward on special cars operated over the mine track, which has been extended 300 ft. in heading No. 2. Pans of the right-hand cross conveyor are moved forward on buggies operating on the shaker-pan lines. It follows that the shaker pans are moved in the same way, one at a time as they are dismantled, beginning at the rear end.

Rock dust is brought in over track C (Fig. 2) and unloaded at the end of that track, where the bags are distributed by reversed operation of chain conveyors and by buggies on pan lines. Local dolomite rock, crushed and pulverized, is used and this dusting of the headings and crosscuts is done by hand. The rule is to keep the advance dust line within 15 ft. of the face.

Other materials, principally timber, are unloaded at the coal-loading point and carried in on the mother chain conveyor. All of this moving of materials is done by the regular face-crew men.

Headings are timbered by 6-in. round posts with 4x6x24-in. caps and placed on 4-ft. centers except where a wider space must be left open for moving equipment. This timber is the local Southern or loblolly pine, which has been treated in the field by the Osmose process. When it is necessary to cut the timbers inside of the mine the raw places are painted with Osmose plastic or creosote oil.

All motors and controls in by of the loading-point elevator are permissible or explosion-tested. In the equipment listing of previous paragraphs the motor sizes have already been stated and all of these motors are ball-bearing type. Elevator and conveyor motors all are Westinghouse Type SK except that the left-hand cross conveyor and the heading No. 1 conveyor have Louis Allis Type ENA motors. The open-type motors of the car hoist and elevator also are Westinghouse Type SK units. All motors are compound except that the shaker motors are shunt-wound.

Sequence Control Used

Automatic starters of conveyors are Ohio Brass Type ADG and all are interconnected to effect sequence control, which feature is accomplished with a single-conductor control line. Starters of the four chain conveyors are reversing type and therefore include an extra switch unit which is connected to its respective starter by a 4-ft. length of four-conductor rubber-jacket cable without external connectors. Figs.

3 and 5 indicate the scheme of electrical wiring used throughout the conveyor section. In Fig. 5 the conveyors of the left-hand headings 1 and 2 and of the right-hand headings 5 and 6 are omitted because their controls and wiring are essentially repetitions of others included on the diagram.

All power-cable and control wire connections are made with Miller connectors vulcanized to Tirez selenium jacket cable. All cables were purchased from the Sullivan Machinery Co. made up complete with connectors and built to exact lengths as specified by the coal company's engineers. In operation, to eliminate any chance of a connector being pulled apart under a circumstance

which would entail danger of gas ignition, the plug and socket are locked together by a chain and padlock, as may be seen in Fig. 6. The motor inspector is the only man on the shift who has a key to these connector padlocks.

Mining-machine trailing cables are connected to the cross-heading feeder and ground cable through 200-amp. Ohio Brass fused permissible junction boxes, as indicated by the wiring plan (Fig. 5). Mountings of these junction boxes on the cross heading are illustrated in Figs. 6, 7, and 8.

Principal business of the Woodward Iron Co., which operates iron ore mines as well as coal mines (captive), is merchant pig iron.

MINING ECONOMIES

+ Viewed by an Underground Foreman

In the Anthracite Field

By K. ARTHUR CHARLESWORTH

*Mine Foreman
Monarch Anthracite Mining Co.*

"SAFETY FIRST" is paramount in successful coal mining. Safety should be considered primarily from a humane standpoint and, secondarily, from the standpoint of company expenditure. In my experience, several accidents have occurred which were absolutely avoidable. The reason for most accidents usually is two-fold: (1) The employee is not properly trained, instructed, or educated by his boss along safety lines; (2) the employee neglects to carry out instructions given by his foreman.

Every man under the supervision of a foreman should be carefully interviewed to determine his experience as a workman in his particular line of duty. He should be given an indelible impression that the foreman is interested in his safety. The foreman should issue instructions along safety lines and be absolutely sure the employee understands what is expected of him to prevent accidents. Many times an employee will become

careless. This is the danger point and must be corrected immediately.

For example, I recall an incident that happened some time ago. I went into a miner's place; he tested the roof; it sounded good. This place was in pillar-robbing work and I instructed the miner to install a prop along the old chamber to make the place safe and be absolutely sure that a slab of rock would not come down from the old chamber and injure the men working in the face. The miner readily consented to stand the prop and I left the face. I returned to the place about 30 minutes later; the prop was not stood and the men were loading coal. I asked the miner why he had not followed my instructions and he offered many unreasonable excuses. I sent this miner home and told him to stay there until he felt he could carry out my orders. He returned to work the next day and I watched him very closely. From that day on he has proved to be one of the safest and

most dependable workmen at the colliery. In other words, a boss must be able to issue instructions and have them carried out. A foreman that cannot do this is a tremendous liability to the company.

Coal can be mined from an area for a reasonable cost figure and at an operating profit, but the cost of one fatal accident distributed over the recoverable coal from that area spells a heavy deficit for the company. Safety cannot be stressed too strongly or carried out too rigidly in the coal-mining business. The results of safety often spell profit or loss on the balance sheet at the end of a stipulated period.

Unused Supplies Raise Costs

Mining-material costs are an important cog in the wheel of results. Material should not be ordered unless absolutely needed. The foreman should ask himself this question before ordering material, "Is there any material in or around the mines which could be used or substituted for the material about to be ordered and achieve the same or satisfactory results?" Presumably wasted material in one section of the mines may prove to be needed material in another section. Wasted material in this day and age is a stumbling block for the success of the company. On the other hand, a minimum material cost proves to be a breadwinner.

Mechanical mining is being introduced on a broad scale throughout the industry in the effort to keep cost in line with realization. It is placed in the mine to increase production and maintain a consistent performance. The care and upkeep of this equipment are vital. Neglect and misuse of this equipment result in breakdowns, which usually necessitate new replacement parts and additional labor costs, as well as loss of production and an increase in the company cost per ton of coal mined. All equipment in the mine should be properly handled to keep breakdowns to a minimum.

Work at the coal mine must be carefully outlined accordingly to try to obtain a new dollar for an old dollar spent. The realization on a ton of coal today is at a low ebb, and work must be done to arrive at that accounting term which makes successful and prosperous enterprises "net profit."

A smooth-running motor accomplishes an objective; on the other

hand, a motor with a burned bearing stops running and naturally is a non-producer. Constant friction between an employee and his immediate supervisor proves to be an eraser of profits for the company. In order to get the answer, a foreman must have the confidence and trust of his men. This requires a lot of study and brings to us the problem of handling men and creating goodwill.

A foreman with an abusive approach is a good man to be working for himself. He will very quickly find out that he must change his tactics or face financial ruin. A cheerful "Good Morning" to an employee sometimes changes his attitude, removing that slinkish feeling in the back of his spine and starting the day off in a bright and cheery manner. A foreman should study the characteristics of each and every employee and determine the proper method of handling him to ascertain the best results. He should show him he is interested in his safety, his welfare, and his home, and get his respect and confidence.

Tact and Common Sense

Do not promise anything because the man whose "word is his bond" never promises. Tomorrow's uncertainties may alter the picture and a revision in plans may become necessary, which will not allow the boss to keep his promise, although the promise was sincere and he meant to keep his word. Much tact coupled with a little common sense minus discriminative and abusive powers equals the goodwill of the employee and an upward trend in producing performance.

Production pays company bills. Production governs many items in the coal business, but the important

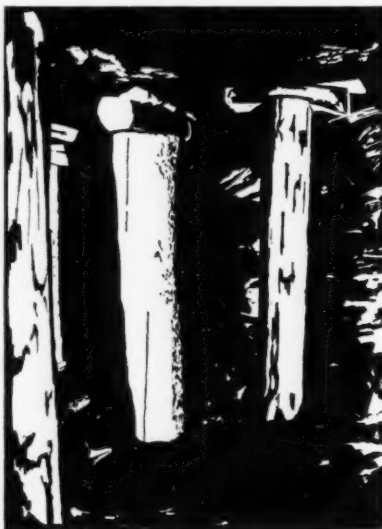
feature is, What are its contents? The condition of the mining business today warrants a car of coal with sufficient topping and a minimum refuse content, coupled with as much prepared-size coal as can be obtained from the vein mined. A well-topped car with a reasonable percentage of refuse equals a respectable yield figure, which is a very prominent factor in determining the net cost per ton. To obtain this yield figure requires many duties on the part of the foreman. He should sell the employee the idea, and make it his every-day diet. A foreman cannot see every car of coal loaded in his section, so he must find ways and means of showing the miner the vital necessity of loading a good car of coal. This must be handled diplomatically. The foreman should explain to the workmen the difference in income and outgo from a clean and well-topped car compared with a dirty and low-topped car. He should painstakingly top a car with the men, showing them what he expects to be loaded. He should show the employees what part of the vein cannot be sold to the market and have them gob as much of that refuse as possible.

Drilling and blasting play very important parts in controlling refuse. These items should be among the foreman's foremost duties. One car of coal properly drilled and blasted is worth two cars of coal carelessly drilled and fired with excessive powder.

Poor Car Turn Costly

Transportation also is a very important factor in arriving at a good yield performance. A foreman cannot expect a miner to give him a good car of coal if he does not receive his cars regularly and at intervals which will give the man ample time during his shift to clean his coal and top his car. In other words, a miner cannot wait one-half the day for cars and be expected to load his shift and produce the much needed yield per mine car.

Yield of prepared sizes determines the income of production at the coal mine. Yield per mine car plus added production creates a large divisor which spells a decrease in the cost per ton for the general, administrative and selling expenses of the company. Hence, good judgment plus an ounce of common sense equals the life of the coal company.



COAL TO GROW FOOD

+ Approaches Half Million Tons Annually

In the State of Ohio

WE DO NOT eat coal but many of us do eat a lot of food grown by coal. This relatively new agricultural use has done its bit to maintain coal demand in the face of competitive fuels. Land that produced one crop of doubtful quality even if favored by weather and if the insects were not too numerous, now produces two crops of many times the original proportions and of far superior quality. Coal furnishes the heat for maintaining the proper temperatures and for cooking the ground in the preparation between crops. Old Sol is depended upon only for furnishing the light.

Tomatoes, cucumbers and leaf lettuce are the principal hothouse crops. Spinach, radishes, parsley, watercress, rhubarb and asparagus are others of consequence. Mushrooms are another coal-using crop, but, instead of being grown under glass, they are grown in sheds and in total darkness.

600 Acres Under Glass

Ohio is the greatest hothouse-vegetable growing State. Its total vegetable acreage under glass is over 600 and this area consumes at least 300,000 tons of bituminous coal per year. That figure is based on an average of 500 tons per acre under glass per year, which is a conservative estimate from approximate data supplied by several growers. One source of information placed the consumption at 650 tons per acre. Taking into consideration mushroom growing, the total coal consumption for food growing in Ohio is placed at not less than 350,000 tons per year.

• With \$22,000,000 invested in hothouse-vegetable growing in eleven counties of Ohio alone, this expanding industry now presents a market for 300,000 tons of bituminous coal per year on the conservative basis of 500 tons' annual consumption per acre under glass. Size of hothouses ranges from 1 to 8 acres, with heating-plant capacities from 75 to 110 hp. per acre at boiler pressures normally 8 to 10 lb., which is increased to about 70 lb. during the weeks of cooking or sterilizing the ground. Increasing possibilities for nut and slack outlets with automatic stoker equipment are cited in this story of coal utilization in growing tomatoes, cucumbers, leaf lettuce, spinach, radishes, parsley, watercress, rhubarb and asparagus for the early markets.

One authority estimated it at close to half a million tons.

Counties bordering on Lake Erie near Cleveland are the favored locations. Reasons are not entirely clear.

A pioneer proved the commercial feasibility near Cleveland and his success no doubt influenced his neighbors. Proximity to the Cleveland market, a fairly central location with respect to the Chicago, New York and Pittsburgh markets, and perhaps a certain amount of climatic tempering by reason of nearness to the lake, all had their effects. Many of the existing hothouses were started in the decade following the World War. In this past decade beginning with the business drop in 1929, the industry has continued to grow and many of the larger plants have added to their acreages. Lower cost of fuel appears to have been a factor in this growth.

A statement filed last year with the Ohio Unemployment Commission showed \$22,000,000 invested in hothouse-vegetable growing and a total of 617 acres under glass situated as follows: Cuyahoga and Lorain counties (Cleveland section),



Vegetable growing under glass requires at least 500 tons of coal per acre per year. Ohio has more than 600 acres, and the investment is \$22,000,000.

300; Ashtabula and Lake counties (Ashtabula section), 100; Lucas county (Toledo), 90; Hamilton and Montgomery counties (Cincinnati and Dayton), 65; Franklin, Licking, Pickaway and Fairfield counties (centering on Columbus, Newark, Circleville and Lancaster), 25; Mahoning County (Youngstown), 12; and about 25 acres scattered over other parts of the State. That report, made by the Ohio Hothouse Co-operative Association — George W. Whitecomb, secretary—includes a statement that Ohio contains approximately one-fourth of the "hothouse glass" of the United States.

Sizes of plants in Ohio range for the most part between 1 and 8 acres and the investment, including heating plant, usually amounts to or exceeds \$30,000 per acre. Heating-plant capacity ranges between 75 and 110 hp. per acre served and for the most part the boilers are the horizontal-return-tubular type. Some firebox boilers are used and a few water-tube units. Boiler pressure, normally 8 to 10 lb. for heating, is increased to around 70 lb. during the weeks of cooking or sterilizing the ground.

A coal dealer situated on the outskirts of Cleveland reports that of the 30 greenhouses he has listed in

that vicinity, about 20 have stokers. These are mostly underfed and use 2-in. nut-slack. Formerly the greenhouse coal supply for that vicinity came principally from Pennsylvania but now it comes from Kentucky, West Virginia and Ohio as well. Only 4 to 5 per cent of the hothouses in the Cleveland vicinity use Ohio coal trucked direct from the mines.

Typical of the modern equipment used at hothouses is the plant of A. G. Heinrichs, at Brooklyn Station, on the southern boundary of Cleveland. He has three boilers totaling 580 hp., a 5x180-ft. brick stack and a coal bin that holds 200 tons. One boiler is a 233-hp. Premier firebox type equipped with Skelly stoker. The other two are 175-hp. Oil City make with Canton stokers. A Fairfield conveyor elevates the coal from the bin to spouts feeding the stokers.

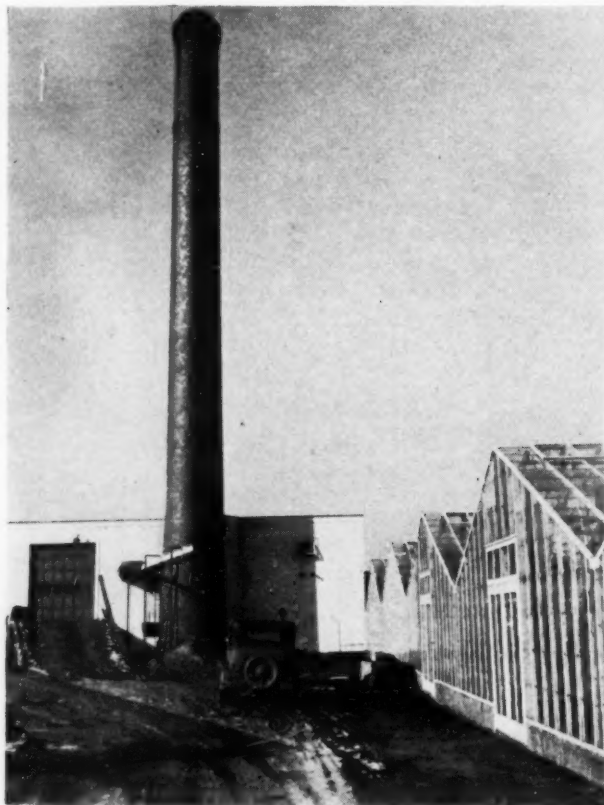
Seventy per cent of the Ohio hothouse acreage is devoted to tomatoes and most large operators grow two crops per year. The spring crop is timed to ripen April 1 to Aug. 1 and the fall crop from Oct. 15 to Jan. 1. Selection of these dates is influenced by several factors: There is a time during late fall and winter that the intensity and duration of sunlight is not sufficient to produce proper pollenization. At various dates from

about May 1 to Nov. 1 there is competition of outdoor-grown tomatoes from States south of the Ohio River. Competition from Cuba becomes particularly serious Dec. 1, when, under a recent Federal reciprocal trade agreement, greatly reduced tariff rates begin for the period of December, January and February. Thus the coal-mining industry is not alone in its wails against reciprocal trade agreements.

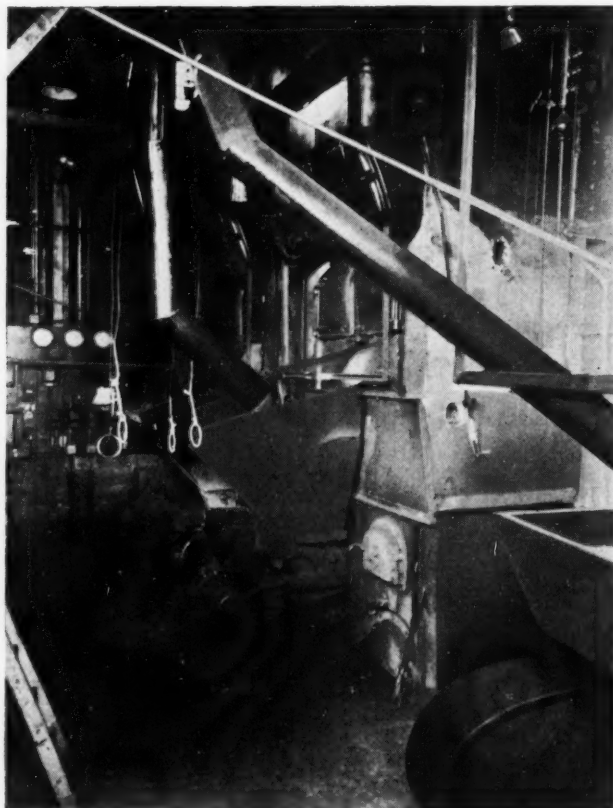
Temperatures maintained for tomatoes are: nights, not less than 55 deg. F.; days, 60 deg. and up. The vines are trained up on twine to a supporting pipe 7½ ft. high and then allowed to grow and hang down on the other side, and with full growth they nearly reach the ground. The pollenization is accomplished by hitting the flower clusters individually with paddles or, if dry, by striking the vine with a short piece of rubber hose. Honey bees will not touch tomato flowers, otherwise hives of bees would be kept in the hothouse to do the job, as is the case when growing cucumbers.

Heating is by direct radiation from steam pipes evenly spaced over the area. Soil-cooking facilities consist of lines of 3-in. farm drainage tile placed 14 in. below the surface and 3 ft. apart, into which live steam

The modern boiler plant of A. G. Heinrichs' hothouse near Cleveland.



The Heinrichs plant consists of three boilers with stokers and automatic control.



is turned. This cooking, which sterilizes against plant diseases, consists of raising the soil temperature to 180 to 200 deg. and holding it there for several hours. This places a heavy demand on the steam plant; therefore only a small plot can be treated at one time and this treatment of each plot takes ten hours. With the ordinary boiler-room capacity three to four weeks is required to sterilize a 5-acre hothouse. Most growers cook once a year during the summer months, hence their boiler plants are in use considerably longer than the heating season, which begins in September and continues to June. Some growers, particularly those specializing in tomatoes and cucumbers, known as the "hot crops," sterilize twice a year.

Temperature requirements for cucumbers are: nights, 65 to 70 deg.; days, 70 and up. Leaf lettuce is a colder crop and its requirements are: nights, 48 deg.; days, 55 to 75 deg. Head lettuce cannot be grown because the natural light in Ohio is not sufficient to produce proper development. A grower of leaf lettuce in some cases is able to grow three crops of lettuce and then one late spring crop of tomatoes. Growth of vegetables can be promoted by artificial light, but the power cost exceeds the advantage which might accrue from this step.

Hothouse Jobs Steady

That hothouse labor has fairly steady employment is attested by the fact that a number of growers use the same number of men the year around. In addition to the picking, which with tomatoes goes on for about 90 days and takes a few hours per day for three days per week, there are the jobs of sterilizing, preparing the soil, planting, watering, trimming, tying, fertilizing and pollinating. A plant of three acres specializing in tomatoes keeps seven men busy the year around.

Ohio contains three to four mushroom-growing plants which together total about 25 acres. Shed area is not that large because this crop is grown in trays one above the other and spaced a few feet apart. Inasmuch as mushroom workers use electric cap lamps, a coal miner is right at home visiting one of these plants.



Three crops of leaf lettuce and one crop of tomatoes are grown in some hothouses. This worker is cutting, boxing and weighing leaf lettuce for market.

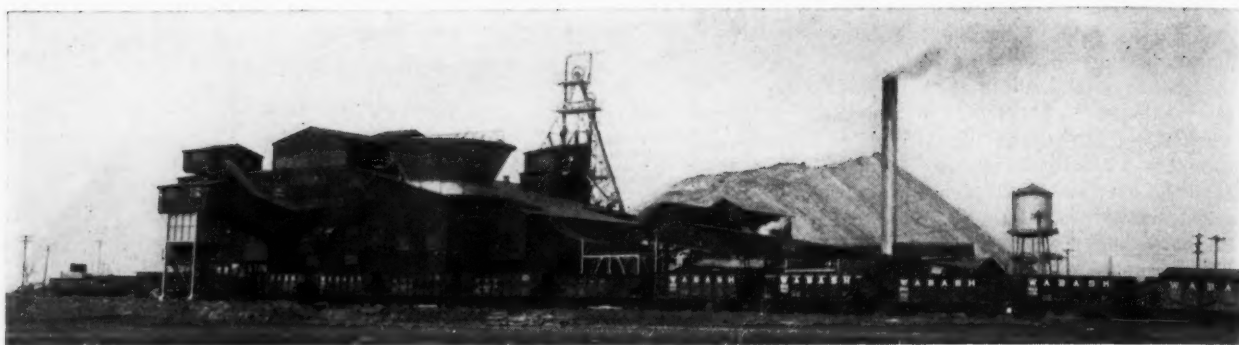
Growing of mushrooms in sheds ceases during the late spring, summer and early fall because natural temperatures in the sheds mount above the limits for existence of the fungus. A mushroom is 88 per cent water. Of the remaining 12 per cent, one-half comes from the soil and one-half from the air. At regular intervals the air in the shed must be changed.

Of the several Ohio mushroom plants, one owned by the Yoeders, who also are large operators of flower greenhouses, is in a huge fireproof stock barn built on a country estate near Barberton by the late O. C. Barber. It was intended for his thoroughbred cattle and is said to have cost close to \$1,500,000. This barn, built of brick, tile, steel and concrete, has three floors, is 35x800 ft. and is fitted with approximately 7 acres of mushroom tray space. This past winter about $3\frac{1}{2}$ acres was in use and the daily output of mushrooms averaged 3,000 lb. The same interests operate a 40-acre mushroom plant in an abandoned limestone mine in Pennsylvania, which State is the largest producer of mushrooms. Most of them are produced, however,

in sheds that are in need of heating.

Although Ohio has 275 acres of flower greenhouses, it fails to lead the Union in that industry as it does in vegetable growing. Illinois probably has a much larger acreage of flowers under glass. One owner of a flower-growing plant in Ohio estimated that he uses between 500 and 600 tons of coal per acre, hence the flower-growing industry must add materially to the total of fuel demand for glass-covered acres.

Concentration, uniformity of product, continuous operation and protection against the vagaries of nature are of high importance in any industry. Agriculture is no exception, and in one State at least—Ohio—a significant percentage of the truck-gardening acreage has been put under glass. As long as the cost of fuel is not increased, reasoning points to a continued extension of vegetable growing under glass. What of the new method by which plants are grown with the roots in chemical solutions without soil? A progressive hothouse owner answered that question: "It's interesting but the cost of the chemicals makes it prohibitive."



Home of "Peabody Westville" coal
—No 24 preparation plant

EFFICIENCY IN CLEANING

+ Plus Maximum Flexibility in Operation

Feature Westville No. 24 Plant

FIFTH in the line of installations at the Illinois properties of the Peabody Coal Co., the new Westville No. 24 mechanical preparation plant features maximum flexibility, washing of all coal from 6-in. down, storage bins for washed carbon and a rescreening plant with bins and proportioning feeders for shipping stoker or screenings with definitely fixed percentages of the various size fractions. Rescreener sizes also may be returned to the main mixing conveyor for mixing with the larger washed and hand-picked sizes in making combinations or modifications with, if desired, specified percentages of the rescreener grades.

Provisions are made for removing minus 28-mesh dust before the coal is washed and for washing all or part of the 1½x0-in. raw coal, loading the remainder into cars, either with or without dedusting, for shipment or redumping and washing on the second shift. A magnetic pulley removes tramp iron from the minus 1½-in. raw product before it goes to the cars, while a second pulley precedes the wash box. The plant also is designed so that part or all the lump off the picking table may be crushed and either washed and loaded or washed and sent to the rescreener. In addition, loaded cars of lump or other sizes may be redumped, crushed and put through the regular prepara-

tion cycle. Middlings from the picking table and the washer are crushed and recirculated to salvage coal values and provisions are made for oil-treating all grades to render them dustless.

As No. 24 has a large local truck trade in addition to its rail business, this fact was taken into consideration in the construction of the new plant, in which all rescreener bins are arranged for truck loading through chutes—equipped, where necessary, with degradation screens. A special mixing conveyor with a counterweighted boom terminal also makes it possible to load combinations of the rescreener sizes in covered or open trucks. And in the case of the large sizes (lump, egg and No. 1 nut), the original retail bins were enlarged and additional rescreening loading chutes were installed.

From the electrical standpoint, the new plant is arranged both for full-automatic starting in sequence and for manual starting. One master and three auxiliary control boards are installed, and a special transformer-and-circuit set-up permits operation of the retail facilities and the mine-rock-disposal equipment on idle days. Wire and conduit sizes have been made sufficiently large to accommodate substantial increases in motor and circuit sizes in the future. Emergency stop buttons are installed

By IVAN A. GIVEN

Associate Editor, Coal Age

at each motor. Squirrel-cage motors controlled by magnetic starters are used almost without exception, and each motor circuit is protected by a fused safety switch. Reducers and V-belts are the most-used drive mediums.

Westville No. 24 mine, of which John Hope is superintendent, is located near Cathin, in the Danville district of Illinois. Production comes from the No. 6 seam and the average daily output is 4,000 tons, derived from one loading shift. Impurities in the seam itself include the usual No. 6 "blue band," about 1 to 3 in. in thickness, as well as sulphur in the form of pyrites. The bottom is fireclay and normally very little gets in the coal. The roof, however, is a weak and treacherous soapstone, with the result that much of it, known as "white rock," finds its way into the coal and consequently comes to the surface, inasmuch as mechanical loading is the rule and no opportunity, therefore, is afforded for cleaning at the face. In fact the white rock was a major factor in the decision to adopt washing, inasmuch as it tended to concentrate in the smaller sizes where hand-picking normally is inefficient and unprofitable.

Sinking to open No. 24 mine was started in 1903. The tippie structure for the original plant consisted of timbers from the St. Louis World's Fair of 1904, which were joined together with pegs. At the time wrecking started in preparation for the construction of the new plant, the old tippie included shaker screens, three apron-type picking table-loading booms, a screenings chute and a crusher for breaking down the coarse sizes when desired. Loading was done on four tracks, with truck shipments going out from a three-bin plant, which has been retained in the new preparation set-up. The design and construction of the new plant, which was started in June, 1938, was handled by the Allen & Garcia Co., in cooperation with the operating and engineering departments of the Peabody Coal Co.

Preliminary work on the fresh-water and settling ponds for the new plant was started in July, 1938 while wrecking of the old tippie was begun on Aug. 16. By Sept. 29, construction had proceeded far enough for screening and hand-picking of coarse coal to be done, whereupon hoisting was resumed. The washer and auxiliary equipment were placed in service on Jan. 17, 1939. In tearing down the old plant, which was removed to the ground level, as much of the equipment (loading booms, conveyors, motors, etc.) as was possible was salvaged for use in the new structure, although the total was small in comparison with the new facilities.

Rated Capacity 600 Tons

Rated capacity of the new preparation plant is 600 tons per hour, and it has five loading tracks, as compared with four for the old tippie. However, coal can be loaded at eight separate points in the new plant, which means two loading points on each of three of the loading tracks. A 6-in. lump is made on the mine-run screen, while 1½-in. screenings from this screen may be loaded raw with or without dedusting at 28-mesh, in both cases passing over a magnetic pulley to remove tramp iron. Washed 6-in.x28-mesh coal may be separated on classifying screens into 6x3- or 6x2-in. egg, 3x2-in. nut (only when running 6x3-in. egg), 2x1½-in. nut, 1½x5/16-in. size and a minus 5/16-in. resultant (nominally 5/16 in.x28 mesh, inasmuch as the coal normally is dedusted before washing to minimize the slurry problem).

Coal from 2 in. down to 5/16 in. may be loaded without further operations or conveyed to the rescreener,

while coal under 5/16 in. goes to de-watering screens, where it is separated into 5/16-in.x10-mesh and 10x28-mesh fractions, both of which go to storage bins, from which they are conveyed to the rescreening plant. This latter plant is equipped with the necessary screens and bins for separating out and storing, or storing alone, 2x1½-in., 1½x¾-in., ¾x5/16-in., 5/16-in.x10-mesh and 10x28-mesh sizes. A sixth bin receives minus 28-mesh dust made in the dedusting operations.

Thus, with all screening facilities operating, the mine-run feed may be separated into 6-in. hand-picked lump, 1½-in.x28-mesh raw screenings, minus 28-mesh dust and the following washed sizes: 6x3- or 6x2-in. egg, 3x2-in. No. 1 nut, 2x1½-in. No. 2 nut, 1½x¾-in. No. 3 nut, ¾x5/16-in. No. 4 nut, 5/16-in.x10-mesh carbon and 10x28-mesh carbon. Mixing facilities permit the shipment of any desired combinations of these sizes, and in combinations including sizes from the rescreener the percentages of rescreener sizes can be varied as desired.

Dependent upon the extent of washing and other operations, four major preparation set-ups are possible on the day shift. The first contemplates only the shipment of raw coal. The second ("minimum washing") is based on hand-picking 6-in. lump, washing 6x1½-in. coal and loading 1½-in. screenings raw over the magnetic pulley. The third ("dedusting and minimum washing") contemplates hand-picking 6-in. lump and washing 6x1½-in. coal and part of the 1½-in.x28-mesh fraction, followed by binning of the washed 1½-in.x28-mesh in the rescreening plant and loading of the remainder of the 1½-in.x28-mesh screenings over the magnetic pulley in their raw state. The fourth ("complete dedusting, washing and rescreening") comprises hand-picking the 6-in. lump, washing 6x1½-in. coal and part of the 1½-in.x28-mesh fraction, loading the remainder of the 1½-in.x28-mesh material over the magnetic pulley, and loading out of the rescreening plant. Naturally, a number of modifications are possible in the four major set-ups, of which one, as an example, is running all the 1½-in.x28-mesh fraction to the washing unit.

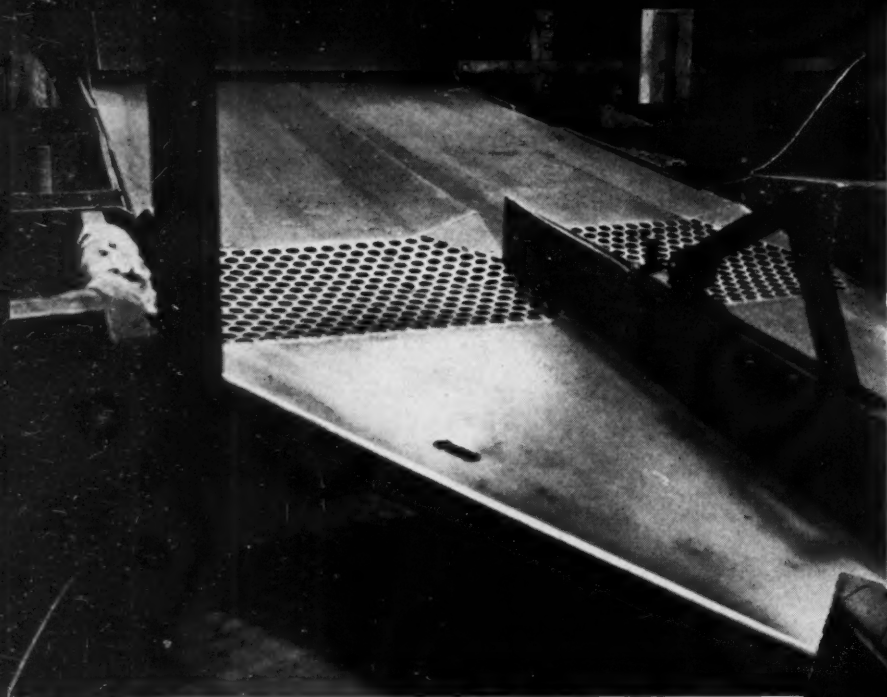
As a general rule, however, at least a part and frequently all of the 1½-in.x28-mesh size is loaded over the magnetic pulley into railroad cars for shipment raw or for re-dumping and washing on the night shift. For this latter purpose, a track hopper and return belt have been installed. The hopper also is

useful for crushing coarse coal already loaded and returning it to the plant. Underneath the track hopper is an inclined scraper conveyor and a reciprocating feeder fitted with a Link-Belt "P.I.V." gear for speed changing. The scraper conveyor discharges screenings through a gate onto a Jeffrey return belt conveyor fitted with a Goodrich belt (the same applies to all other belt conveyors in the plant). In case coarse coal is re-dumped, the gate is closed and the material is scraped over a 3-in. bar screen to take out the small material and then into a Link-Belt crusher adjustable to reduce the feed to minus 6 or minus 3 in. This crushed coal falls onto the belt conveyor, which takes it to the dedusting vibrators, although the normal feed is directly to the washer-feed belt conveyor.

Mine-run is hoisted at No. 24 in cars holding an average of 6,200 lb. These cars are dumped through a chute into a weigh pan. Gates in the chute permit bypassing mine rock to a storage hopper, from which it is fed out onto a 48-in. belt conveyor to the refuse bin. Coal goes from the weigh pan over an apron feeder to a shaker screen making 6-in. lump and 6x1½- and minus 1½-in. subsidiary sizes. Bars ahead of the screen take out the extra-large lumps, which are broken down to manageable sizes with sledges. The 6-in. lump goes onto a divided shaking picking table where picking is arranged to yield two products: a pure refuse, which goes to the tippie refuse conveyor and thence to the refuse bin, and a middlings product. The latter is conveyed to a McNally-Pittsburg crusher for reduction to a top size varying from 3 in. down to 1½ in. Crushed middlings are chuted to a raw-coal conveyor discharging onto a belt conveyor to the washing unit.

Handling Picked Lump

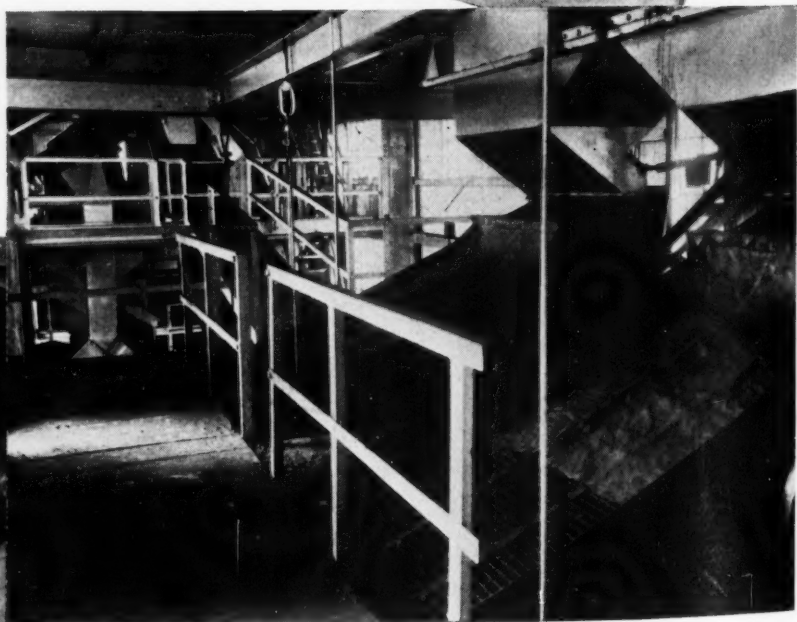
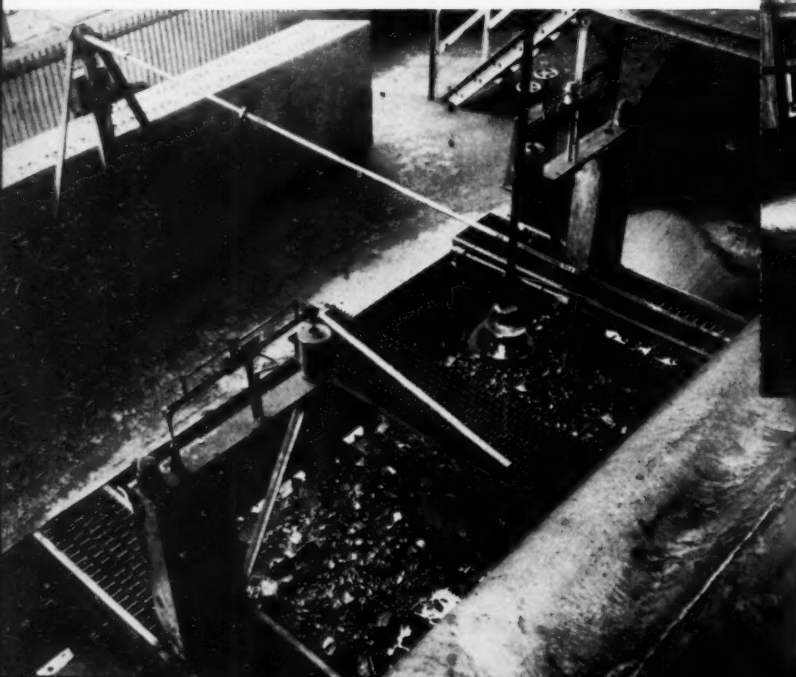
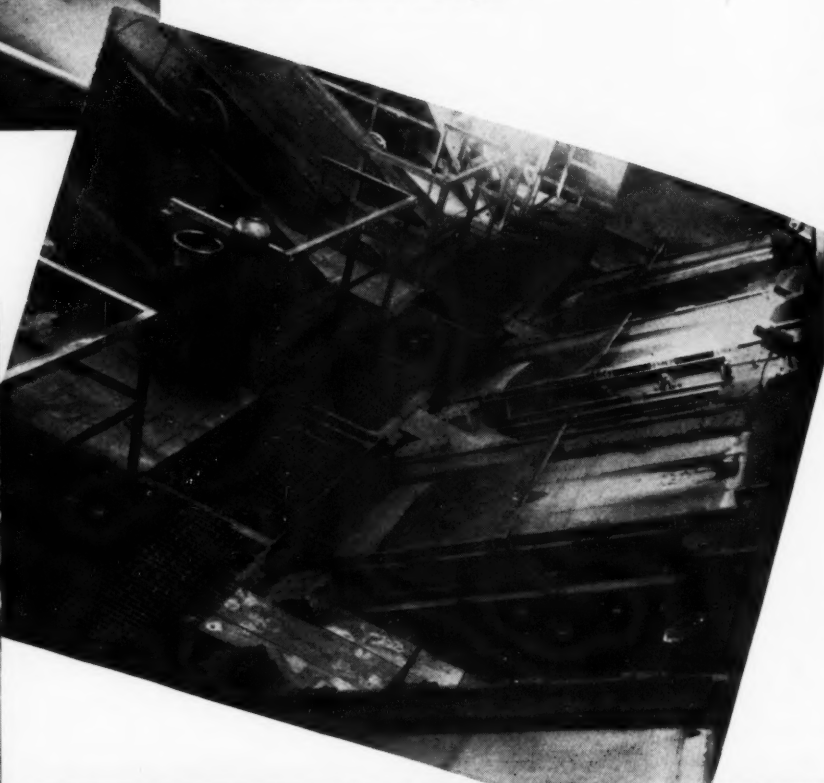
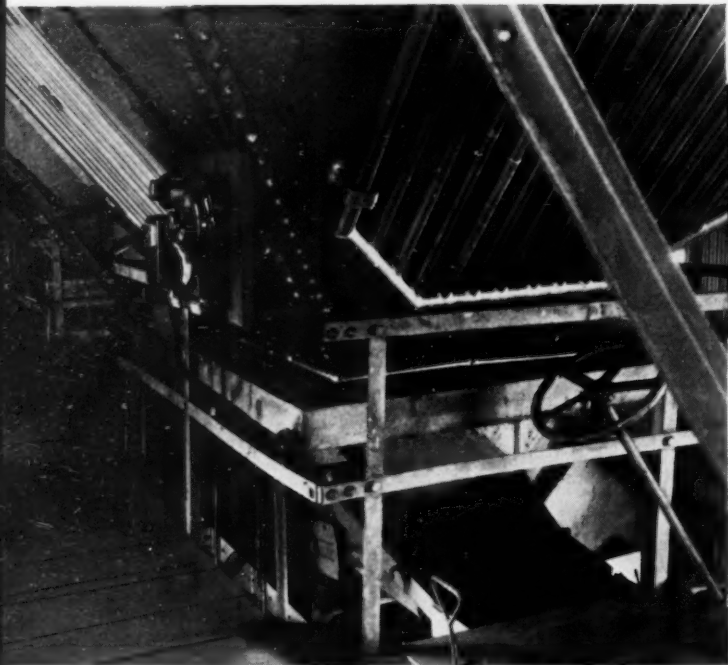
Picked lump passes over a degradation screen and then flows onto a Jeffrey apron-type loading boom. However, the end of the table is equipped with a gate to divert half or all of the picked lump to a McNally-Pittsburg primary crusher, adjustable to break to 6 in. down to 1½ in. This crusher also receives the lump degradation, and the crushed coal drops onto a conveyor leading to a raw-coal conveyor to the washer-feed conveyor. As an alternative, however, the crushed product may be routed around to the mixing conveyor for loading or use in making combinations or for further transportation to the rescreening plant,



Left—The gate at the lower end of this shaking picking table permits splitting half or all of the picked lump out for crushing.

Below—Screening of minus 1 1/4-in. coal is done on the two screens at the left, with the removal of 28-mesh dust from the minus 5/16-in. fraction on the four screens at the right.

Below—Part of the storage bins in the No. 24 rescreening plant. Electrically controlled vibrating feeders permit loading a uniform mixture.



Above—Screening equipment in the No. 24 rescreening plant. The two primary vibrating screens are in the right foreground, with the two secondary screens in the rear.

Left—The Westville No. 24 washing unit handles coal up to 6 in. in size and is equipped with mercury switches actuated by floats for controlling operation of the reject gates. In the background is the master control panel.

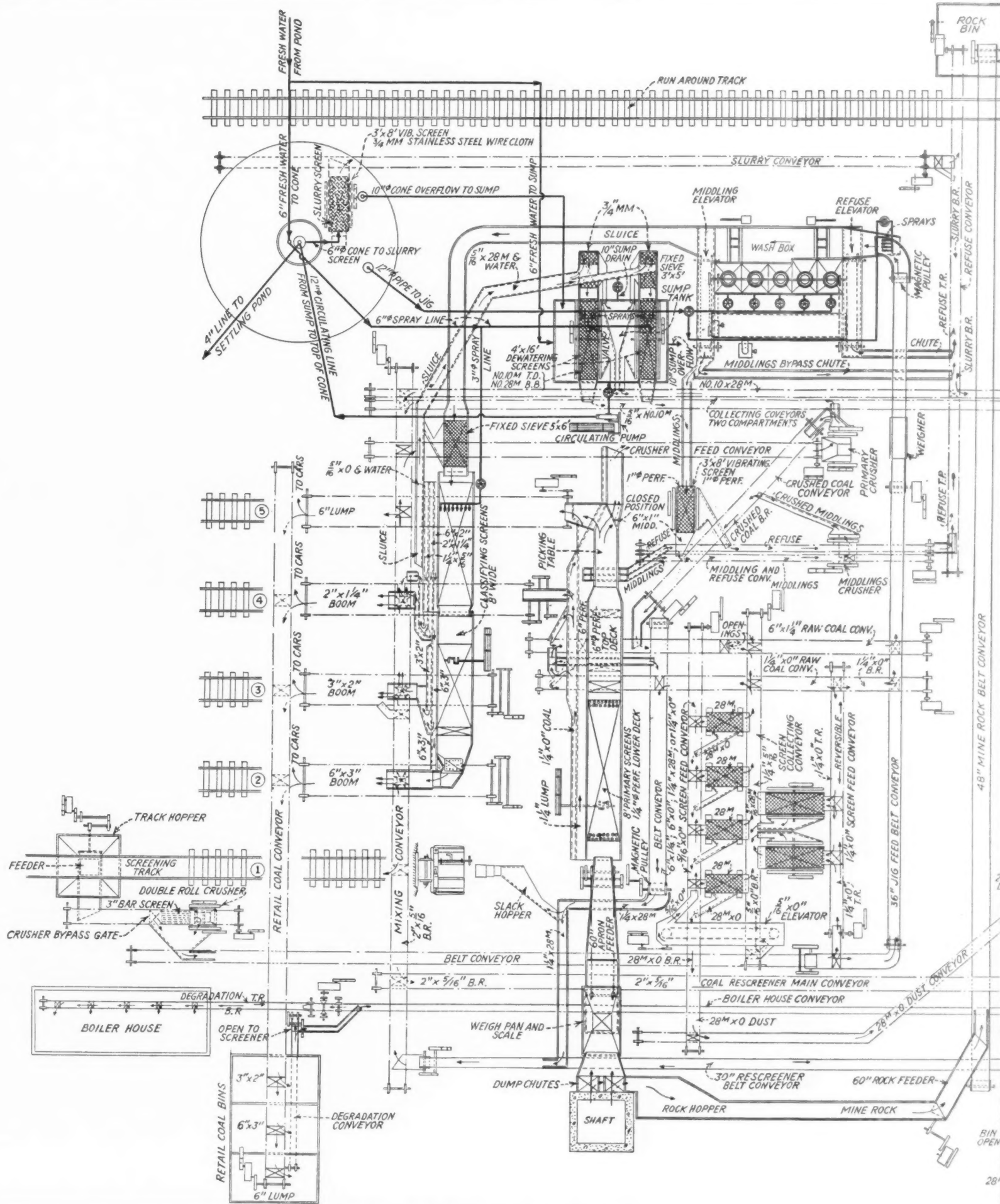
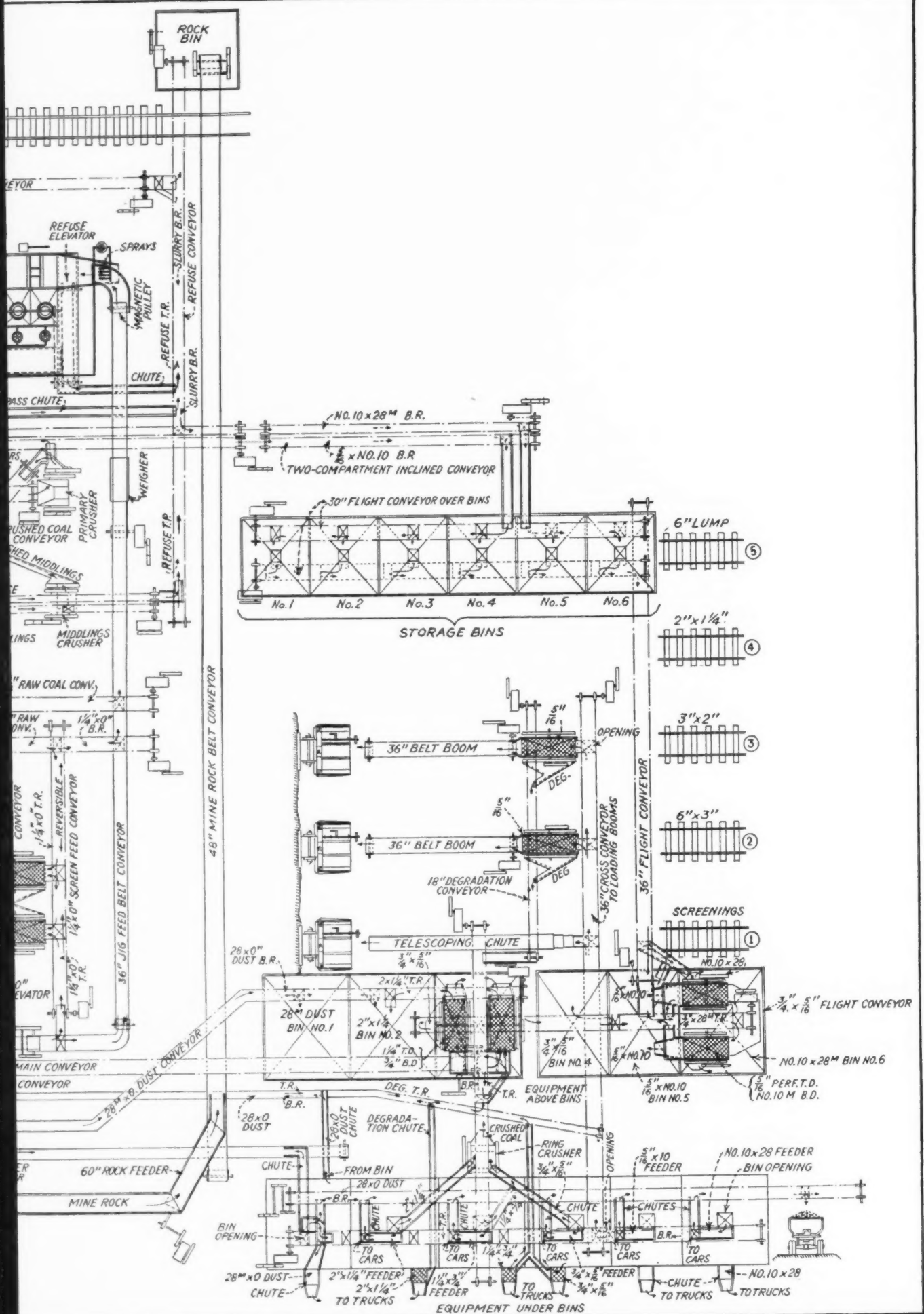


Fig. 1—Westville No. 24 preparation plant is designed for maximum flexibility in from dump to loading points, thus making it possible to meet all normal market



Designed for maximum flexibility in coal routing
possible to meet all normal market requirements.

as indicated in the flowsheet (Fig. 1).

The 6x1½-in. fraction from the mine-run screen can be run to a raw-coal conveyor discharging onto the washer-feed conveyor; to the crusher-feed conveyor; to an apron-type loading boom for shipment raw; or to the belt conveyor equipped with a magnetic pulley and thence to a loading chute or, via auxiliary conveyors, to the mixing conveyor. The 1½-in. screenings also may be sent by conveyor directly to the washer-feed conveyor or they can be run over the magnetic pulley and into a hopper, from which they may be loaded raw by means of a telescopic chute. As an alternative, they may be routed from the magnetic pulley to the mixing conveyor.

Bypassing for Dedusting

But when screenings are to be dedusted or run to the washer, they are conveyed to two Tyler-Niagara vibrating screens which separate them into 1½x5/16- and minus 5/16-in. fractions. The latter then is elevated to a distributing conveyor feeding four Tyler 400 electric screens, which remove the 28-mesh dust. Swinging gates in the chutes preceding these screens are fitted with mercury switches which automatically start the motors when the coal begins to flow and shut them off when it stops. The dust is conveyed to a bin in the rescreening plant, while the 5/16-in.x28-mesh size joins the 1½x5/16 in. fraction in a collecting conveyor discharging to one or the other of the raw-coal conveyors, which either deliver the coal to the belt and magnetic pulley for loading raw or discharge it onto the washer-feed conveyor. As previously stated, divided gates permit running all or part of the 1½-in. screenings to the dedusting installation and leaving the remainder, containing the 28-mesh dust for subsequent treatment or loading. Thus it is possible to ship 1½-in. or 1½-in.x28-mesh raw screenings while at the same time making washed grades in the range between 1½ in. and 28 mesh.

Coal under 6 in. is cleaned in a Link-Belt Simon-Carves washer at the Westville No. 24 plant. This washer handles either 6x1½-in., 6x0-in., 6-in.x28-mesh or 1½-in.x28-mesh raw coal, as well as washer and picking-table middlings. The Jeffrey belt conveyor feeding the washer is equipped with a Merrick "Weightometer" to record the weight of the raw feed to the cleaning unit, while a Stearns magnetic pulley at the discharge end keeps tramp iron out of the wash box and refuse gates.

Instead of the usual "electric-eye" refuse-gate control, the Westville washer has been equipped with a mercury-switch control developed by Peabody engineers. This control, as shown in an accompanying illustration, works off the jig floats in the usual manner. When the float rises far enough it tilts the mercury switch, which, through a relay, starts the gate motor. Then, as the refuse level falls, the mercury switch is tilted back, breaking the circuit. A dashpot prevents excessive jiggling of the control arm on which the switch is mounted.

Material brought up on the No. 1 wash-box elevator goes directly to the refuse conveyor. No. 2 elevator material, however, usually is passed over a Summit vibrating screen, although it can be sent directly to the refuse bin. The screen separates the refuse into plus and minus 1-in. fractions, the latter going to the refuse conveyor and the former, or oversize, going to the middlings crusher, noted above, for reduction and recirculation.

Washed coal and water flow down a sluice to a fixed screen (wedge wire) which unloads fines and water, and then goes onto a pair of shaking classifying screens. These screens separate it into four or five sizes, of which the smallest is minus 5/16 in. The larger sizes go into their respective loading booms or into the mixing conveyor for making combinations or, in the case of 2x5/16-in. material, transportation to the main rescreener conveyor. Minus 5/16-in. and water go to fixed screens (¾-mm. wedge wire) ahead of two Tyler-Niagara dewatering screens making 5/16-in.x10-mesh and 10x28-mesh sizes.

Fines through the ¾-mm. fixed sieves flow into a sump, from which they are pumped up to a settling cone by a Morris centrifugal circulating pump. The cone normally is bled continuously to a Morrison vibrator fitted with ¾-mm. stainless-steel cloth. Oversize goes to the refuse, while the water and minus ¾-mm. material go back to the sump. The slurry also can be dumped from the cone and pumped to a settling pond; but the screen obviates much of this dumping and consequently saves water. A Fairbanks-Morse pump at the settling pond is available for returning clarified water to the fresh-water pond, from which a Chicago pump relays it to the cone or the sump. Connecting lines serve the sprays on the classifying and dewatering screens.

The two sizes of coal made on the two dewatering screens go into sep-

arate compartments in a two-compartment collecting conveyor, which carries them to the rescreener conveyor or to an elevating conveyor to a distributing conveyor over carbon storage bins. Six such bins, each with a capacity of 93 tons, are installed. Three receive 10x28-mesh coal and three the 5/16-in.x10-mesh product. The carbon sizes are drawn off from the bottoms of the bins into a collecting conveyor operated by an Allis-Chalmers "Vari-Pitch" drive to vary the rate of feed to the elevating conveyor leading up to the rescreening plant.

The Westville No. 24 rescreening plant, in addition to washed carbon sizes, also can receive 2x5/16-in. and 1½x5/16-in. washed coal from the classifying screens in the main plant. Screen equipment in the rescreening plant is designed to produce 2x1½-in., 1½x¾-in., ¾x5/16-in., 5/16-in.x10-mesh and 10x28-mesh sizes, each of which goes into bins holding approximately 100 tons. A sixth (smaller) bin receives minus 28-mesh dust from the dedusting screens in the main plant.

Coal brought in from the main plant on the rescreener-feed conveyor or is discharged onto two double-deck Tyler-Niagara vibrating screens which separate it, depending upon the feed, into 2x1½-, 1½x¾- and ¾x5/16-in. sizes, each to a separate bin. The screens also receive crushed 2x¾-in. washed coal, in which case the minus ¾-in. fraction is conveyed to two additional Tyler-Niagara vibrators, which also may be used to rescreen coal 5/16-in.x10-mesh and 10x28-mesh from the carbon-storage bins, although the carbon sizes may be run directly to their respective storage bins.

Vibrating Bin Feeders

Bins for all sizes down to minus 28-mesh are equipped with Jeffrey-Traylor electric vibrating feeders, the speed of which is adjustable by means of rheostats to permit loading a uniform mixture. The bins also are equipped with separate chutes for loading trucks, including Holmes rescreening "Dustolators" in the case of 2x1½-, 1½x¾ and ¾x5/16. Individual sizes or combinations of sizes may be run out on a mixing conveyor or to a truck-loading boom. Or the various sizes or combinations may be run back into the main plant for making other combinations. And, finally, a telescopic loading chute and two loading booms are available for placing individual rescreener sizes or combinations of the various size fractions in railroad cars.

The loading booms are preceded

by Robins "Vibrex" degradation screens, and the degradation is returned by conveyor and elevator to the primary rescreening vibrators. Degradation from the "Dustolators" goes either to the boiler-house conveyor or to the primary vibrators. The minus 28-mesh dust also may be run from the bin to the boiler-house conveyor. Officials now are considering the installation of new stokers to permit the use of all this dust when a market is not available. Equipment in the rescreening plant also includes an American AC3D ring crusher to break down either or all the 2x1 $\frac{1}{4}$ -, 1 $\frac{1}{4}$ x $\frac{3}{4}$ - and $\frac{3}{4}$ x5/16-in. sizes, the crushed coal going back up by elevator to the primary vibrators for rescreening to eliminate oversize.

The original retail plant for coarse sizes was retained and enlarged when the new preparation plant was built. Height of the bins was raised to increase capacity from around 35 to approximately 100 tons. Three bins equipped with Holmes lowering chutes and each with two loading openings are available for lump, egg and No. 1 nut. These sizes are brought in by means of a reversible conveyor at the ends of the loading booms, which discharge into it in raised position. This conveyor also may be used as an auxiliary mixing conveyor. Lump, egg and nut are loaded out through "Dustolators," with the breakage going back to the boiler room or the rescreening plant.

Any or all sizes may be treated to render them dustproof, using the Criswell heating and spraying system for grades under 2 in. in size and manual treating for the larger sizes, which has been found a more certain method.

A steel structure with corrugated roofing and siding features the Westville No. 24 preparation plant, which is under the supervision of Leslie No-

varia, top foreman. Concrete floors are installed in the washery and at certain other points in the plant, with wood floors and walkways elsewhere, varied by steel grating on stairways and outside walkways. Walkways, stairs, galleries, etc., are equipped with angle-iron railings, and all drives, moving parts, etc., are inclosed in welded screen-plate guards. Lighting over the picking tables and elsewhere in the plant is provided by Major spring-mounted Alzak units with diffusing cover glasses. Jones speed reducers and Gates V-belts are the most-used types of drives, with special units including the "P.I.V." and "Vari-Pitch" drives noted above.

Excluding heating units and certain other miscellaneous equipment, the Westville No. 24 preparation plant is operated by 130 linestart motors, practically all supplied by Allis-Chalmers and practically all, also, of the double-cage type, the principal exceptions being pumps. Starters, with one exception (a manual unit), are magnetic units, primarily Allen-Bradley Nos. 1 to 5 inclusive. The Nos. 4 and 5 types were built especially for Westville to permit paralleling the contactors for larger capacity in a small space. All circuits are protected by Colt "Noark" fused inclosed safety switches.

Motor voltage is 440 and lighting voltage is 220. The tippie motors are supplied by three 500-kva. transformers in closed delta, while two 50-kva. transformers in parallel and connected for 220 volts supply the lights. All wiring is installed in rigid conduit, with flexible conduit for the connections to the motors. Wiring in each case is sufficiently oversize to permit the installation of the next largest size motor and still come within the usual standards.

And, in addition, all conduit was purchased large enough so that it can accommodate a size larger wire, thus giving the management two chances to take care of any load increases on individual circuits in the future simply by changing the heating elements in the starters plus, if necessary, changes in the safety switches to permit the use of larger fuses.

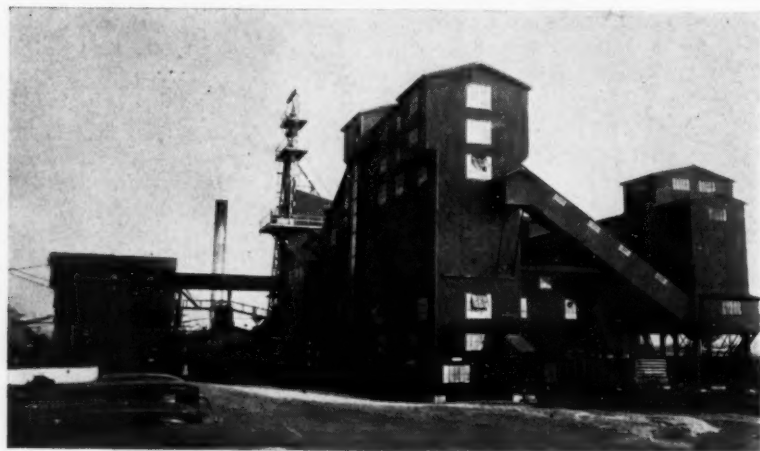
Equipment operation is centered in one console-type master board which is arranged with pushbuttons and pilot lights to show motor operation. The board is designed for setting up various starting sequences, after which all motors start automatically in order with the pressing of one button, red pilot lights showing if one or more fail to come on the line. On the other hand, the automatic sequence may be cut out and the motors started individually in order. In addition to the master panel, auxiliary panels are installed for the control of the operations of the loading booms, the rescreening plant and loading equipment, and the mine-rock-disposal system. The facilities controlled from these auxiliary panels may be operated from the master board, but normally control is transferred to the auxiliary boards.

Idle-Day Operation

To permit the operation of retail-loading equipment on idle days, and the mine-rock disposal system as well, a special circuit fed by three 37-kva. transformers (closed delta) is installed, with the motors controlled from the auxiliary panels. Control cables from the master board to the switch room are No. 16 rubber-covered wires in groups of five in braid covers. The cables are installed in "Square Duet." Because of the extra functions of the circuits between the master board and the rescreening and rock-disposal boards, eight control wires are required. These were secured by using two five-conductor cables with two spare wires.

All motors are equipped with lock-out buttons as close as possible for emergency use, the indicating circuits providing both a visual signal on the master board and an audible horn signal. The emergency signal circuits are 30-per-cent-Para rubber-covered No. 14 wires. Nos. 14 and 12 wires are used in the lighting circuits. Three "washout" buttons are installed in the plant, these buttons stopping everything except the m.g. set powering the magnetic pulleys and the pump motors, which continue to run until specifically shut down.

Looking east at Westville No. 24 preparation plant, with carbon-storage plant at right, rescreening plant with loading chutes and mixing-conveyor boom in center, and coarse-coal retail plant in left background



TESTING AND PRE-GROUTING

+ At Mead No. 2 Airshaft

Contributed to Speed in Sinking

By **WILLIAM YATES**

*General Superintendent
C. H. Mead Coal Co.*

SINKING an airshaft 350 ft. into advance workings of No. 3 mine of the C. H. Mead Coal Co., East Gulf, W. Va., was accomplished in 82 days total elapsed time. Pre-grouting of core-drill holes bored primarily for testing strata resulted in a dry shaft. The project, which as a whole cost \$30,000, resulted in cutting air travel from 5 miles to $2\frac{1}{2}$ miles, thus reducing water gage from 5.2 in. to 3.1 in. and increasing the volume from 83,000 to 130,000 c.f.m. Eleven months previous to completion of the shaft a new Jeffrey 6-ft. single-stage Aerodyne fan had been installed at No. 3. The increased ventilation by shortening of air travel was secured at 9 hp. less than the demand previously required for driving the Aerodyne. Also, a 7-ft. fan of the same type and make was installed at No. 2 mine. It delivers 150,000 c.f.m.

Output 5,500 Tons Per Day

Mines No. 2 and 3 of the C. H. Mead company, situated in the Wind-ing Gulf district, Raleigh County, and controlled by the North American Coal Corporation, haul to one tippie and preparation plant situated at No. 2 and the production is 5,500 tons per day. This coal, all hand-loaded, comes from 40-in. Pocahontas No. 3 seam. Workings of No. 3 had extended $2\frac{1}{2}$ miles from the main slope (seam depth at slope is 50 ft.) and the mine air supply coming from the same point had become inadequate for further development. The first step was to replace the old inefficient centrifugal fan, and the new unit (the 6-ft. Aerodyne mentioned in the preceding paragraph) was placed in service in March, 1938. A few months later the shaft project was put under way and it was de-

cided that the dimensions should be 12x12 ft. inside of concrete or timbering.

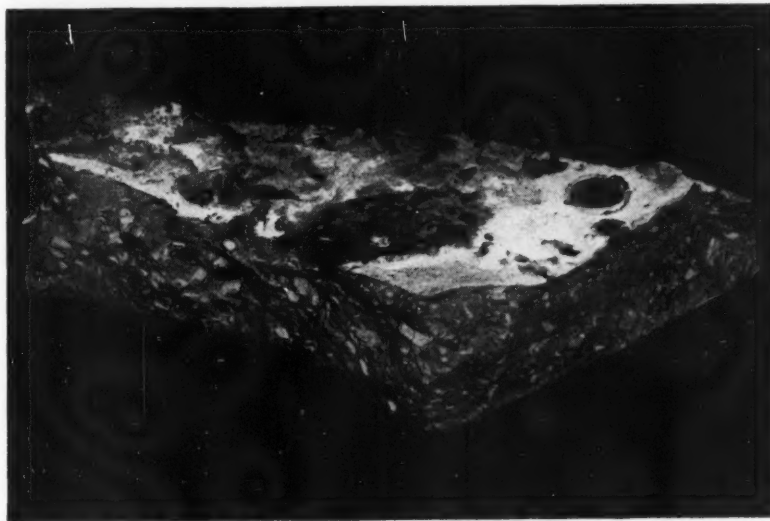
The first step was to drill three core-drill holes to the coal, one at a point to be the center of the shaft and the other two at points on opposite sides and 30 in. from the line of excavation. The core drilling showed alternate layers of shale and sandstone formation and revealed the presence of crevices and water, thus indicating a need for grouting.

Pure cement grout was first pumped into the holes, but there was no indication of plugging, so the grout was changed to a mixture of 25 per cent sawdust and 75 per cent cement. Pumping pure cement grout and holding the pressure at 375 lb. was the final step. During the process the grout oozed out of rock strata in the side of a creek bed 300 ft. from the drillholes. When sinking operations were under way a sheet

of cement $\frac{3}{8}$ in. thick covering the area of the shaft was encountered 40 ft. below the surface. Broken pieces taken from this filling of former void showed the sawdust content. Quantities of cement used in the grouting were as follows: center hole, 221 bags; one of side holes, 279 bags; other side hole, 450 bags.

The grouting was done exclusively by employees of the C. H. Mead Coal Co. under supervision of C. L. Brown, electrical engineer. Holes were drilled by Hoffman Bros., of Punxsutawney, Pa., and the shaft sinking and lining was done by the Williamson Shaft Contracting Co., Columbus, Ohio. To drive the contractor's equipment, consisting of a 55-hp. Thomas hoist, two air compressors (one 250 c.f.m., the other

Sawdust particles are plainly visible in this full-size photograph of a slab of grouting extending over the shaft area at a point 40 ft. below the surface.



500 c.f.m.), and a 10-hp. rotary fan, the coal company built an a.c. transmission line and installed at the shaft location three 37½-kva. 4,000/440-volt transformers. These power transformers have been left in place for a future installation of a fan at this new shaft. Size No. 4 steel-core aluminum wire equivalent to No. 6 copper constitutes the new line.

After a few days' preparation required for the installation of buildings, equipment and headframe, the contractors started excavation of the shaft on Nov. 1, 1938. The last bucket of muck was hoisted from the bottom of the coal to complete the 350-ft. shaft on Jan. 23, 1939. An additional week was required for the excavation and concreting of arches at the bottom of the shaft. Officials of the coal company consider the sinking speed a record, in that locality at least, and have been compli-

mented by several observers as now having the best shaft in West Virginia from the standpoints of alignment, shaft-bottom arrangement and finish generally.

Cycle of operation by the shaft contractor was two shifts per day, six days per week. The day shift consisted of five bottom men, two top men, one hoisting engineer and two carpenters. The night shift was the same except that there were no carpenters. Counting a superintendent, nineteen men were employed and the total man-hours worked during the actual sinking operation were 13,500.

In addition to the power machinery already mentioned, the equipment consisted of three JA55 Ingersoll air drills (also three spare drills kept on hand in case of failures), two ¾-yd. buckets, 500 ft. of ¾-in. Macwhyte non-rotating rope, a 1½-yd. rocker dump car and track reaching

200 ft. from the dumping platform. To conduct air down the shaft 12-in. Ventube was used. The 250-c.f.m. compressor regularly supplied the drills and the 500-c.f.m. unit was held in reserve in case of failure of the smaller unit and to supply extra air if such should be needed for drilling, grouting or pumping water. The V-cut method was followed in drilling, followed by front and back benches. All holes were drilled to a depth of 6 ft. except pilot holes, which were drilled 10 ft. ahead of excavation to locate any water that might be present in the strata. In that event grouting of the hole would be done before further excavation in the shaft.

Down to a point 36 ft. from the surface the shaft was lined with concrete 18 in. thick. Below that and extending for 303½ ft. the lining consists of 5x12 in. x 12-ft. creosoted timbers placed skin to skin, thus forming a smooth lining. Below the timber the shaft was lined with 12 in. of concrete to the bottom of the coal and concrete arches 8 ft. high built to extend back into the airways, which go out in opposite directions on opposite sides. The shaft was finished with a concrete floor.

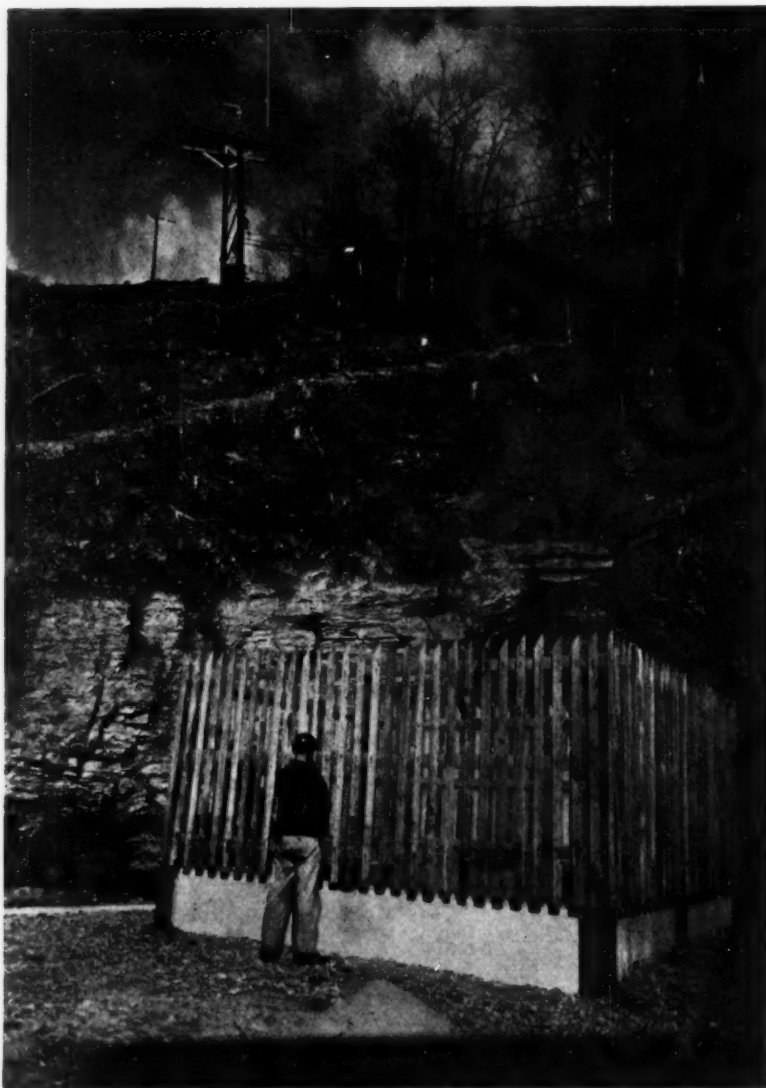
Timber Creosoted

Timbers of each of the four sides of the shaft lining are supported every 50 ft. by 12-in. I-beams arranged in pairs, one beam on each of two opposite sides, at every 25-ft. level of shaft depth. Creosoting of the cut-to-size timbers together with blocks and wedges was done on the job in a two-compartment steam-heated tank. Soaking was handled in one compartment while the previously soaked batch was being drained in the other. The creosote was pumped from one side to the other.

Six parallel headings constitute the main entry of the mine and three headings constitute the cross entries. Three feet of top is taken on the haulage heading of the main and 2 ft. of top on the cross-entry haulage. Haulways are driven 25 ft. wide in the coal and the top rock is gobbled along one side to leave a clear space of 14 to 15 ft. The aircourse headings are driven 15 ft. wide and no top is taken down.

In addition to Mr. Brown, mentioned as having been in charge of the grouting, other local officials concerned directly with construction and operation of the C. H. Mead Coal Co. mines are: J. P. Nowlin, general manager; William Yates, general superintendent; and E. L. Poe, mining engineer.

Started on Nov. 1, 1938, mucking of this 350-ft. shaft was completed Jan. 23, 1939. A line and transformers, to be used for a future fan, were erected to supply the shaft sinking equipment.



TRANSPORTATION PROBLEMS

+ Solved by Chutes, Conveyors and Cars

In Steeply Pitching Wyoming Mine

By IVAN A. GIVEN
Associate Editor, Coal Age

CONVEYORS bring coal from rooms driven up the pitch to a mine-car slope at the new No. 8 "Brilliant" mine of the Kemmerer Coal Co., opened fifteen miles south of Kemmerer, Wyo., in the late summer of 1937. Galvanized-plate chutes are used to conduct the coal from the room faces to the conveyor system, made up of chain-type gathering units and belt-type main-line units. The latter, installed in multiple as necessitated by the length of the entries, carry the coal to a loading point near the slope, where it is chuted into 5-ton steel cars for the final journey to the dump on the surface.

No. 8 mine was opened in a section of coal in the No. 1 vein of what is known as the Frontier series. The dip of the coal is 23 deg. on a line North 76 deg. West, and the slope is driven down the pitch. To provide working places, "strike entries" are turned northeast off the slope and are driven to the northern boundary or other limit. The angle of turning is a little off 90 deg. to permit driving the entries uphill on a 1-percent grade in favor of the drainage. Rooms in turn are driven directly up the pitch off the strike entries and thus parallel the slope.

Thickness of the No. 1 vein at the No. 8 mine ranges from about 14 to 20 ft., and it is characterized by one persistent shale parting 3 to 9 in. thick about 4½ to 5 ft. above the bottom, which is sandstone. Over this shale parting is 12 to 16 ft. of coal under a hard sandstone roof, which in some places is replaced by 6 to 10 in. of soft shale. Top coal is left in these areas. Aside from the main parting, the seam is characterized by occasional bands and subsidiary partings in various thicknesses which cut in and out of the coal. In view of the thickness of the coal and the presence of the main

shale parting, only the upper bench—and that in two stages, for reasons which will be given below—is extracted in opening up rooms and crosscuts. Pillar extraction is set up as the next step and will be accompanied by removal and disposal of the parting by a method yet to be decided and recovery of the bottom bench. The mine staff consists of Glenn E. Sorenson, general superintendent; Rex Coates, mining engineer; Eino Oja, mine foreman; and Jas. Moon, tippie foreman.

In making the opening at No. 8, it was necessary to go through 225 ft. of old mine workings to hit the coal. This part of the slope first was timbered with 90-lb. rails set skin to skin, against which and in which reinforced concrete was placed. In fact, the slope was concreted all around for a distance of 300 ft.—sufficient to take it through the old workings and far enough down into the solid coal for a good seal. In the solid coal, an opening was driven north to the site of the airshaft and a manway and airway were started.

Width of the slope, driven, as stated, down the pitch in the coal, is 12 ft.; height is 10 ft. Airway and manway dimensions are 12x12 ft. Centers for all openings are 100 ft. The slope proper is driven with a Sullivan scraper hoist and a specially designed scraper which pulls the coal from the face up a ramp and dumps it into a standard mine car. Manway and airway are driven up the pitch. In this procedure, a chain conveyor is laid in a crosscut or other opening driven north from the slope. Manway and airway then are driven up with galvanized chutes feeding into the conveyor.

Sixty-pound rail is used on the slope and is carried around far enough into the loading heading on the strike entries to provide trip room. Cars are handled on the slope

by an 800-hp. (two motors) single-drum hoist, which eventually will be replaced by a larger unit. Trips consist of three or four cars and each car weighs 2.4 tons and carries 5 tons of coal. Hoisting speed with the present unit, using a 1½-in. pre-formed wire rope, is 1,200 f.p.m. After the cars pass a switch just outside the slope portal they are dropped back around a curve to a Card rotary dump. Coal weight is ascertained and recorded by means of a Fairbanks dial scale equipped with a "Printomatic" recorder.

Depth of the airshaft to the coal at the point it was sunk was 125 ft. The shaft is circular in shape and is lined with cylindrical sections of ¾-in. steel plate 10 ft. long resting one on top of the other and concreted in place. This type of lining was selected because it offered a relatively cheap and convenient method of shutting off the loose ground encountered. Air is supplied by an 8-ft. Aerovane fan designed for two stages but operated with only one stage. With the one stage and a 10-hp. motor drawing between 7½ and 10 hp., the fan, operated exhausting, circulates 50,000 c.f.m. at a water gage of nearly ¾ in. Edison electric lamps, M-S-A "Skullgards" and safety shoes are used underground. The mine is rock-dusted in accordance with the regulations of the State and the U. S. Bureau of Mines, using for this purpose an American Mine Door "Mighty Midget" conveyor-type dusting machine. The coal company has its own equipment for sampling and analysis to determine the ash content of the mine dust.

Driving up rooms as the strike entries advanced was the practice on the 1st and 2d North strike entries



Left—Tail end of a main belt unit with a chain conveyor used in heading driving discharging onto it.

Below—Cutting a 25-ft.-wide room face on a 23-deg. pitch. The third man is bugdusting the cut.



Left—Loading into temporary chutes in a room face. As the roof has improved, the top coal will be shot down.



Car-loading station with the main chute from the belt-conveyor system coming down from the right.



For safety's sake, transformers in this underground substation are filled with a non-inflammable liquid.

(Fig. 1), with the idea of mining the pillars and recovering the bottom bench on the retreat in the future. The plan on succeeding North entries, however, is to advance them to the boundary and then drive rooms, take out the pillars and extract the bottom bench on the retreat on one strike entry, in the meantime advancing the next so that it will be ready when the first is worked down to the barrier pillar along the main-dip openings. Incidentally, as each strike entry is driven, the width of the barrier pillar will be increased approximately 200 ft. to balance roughly the increase on the opposite side. The wide barrier pillars also are designed to provide a liberal supply of coal in final retreat work.

In view of the increasing thickness of the cover and also the fact that on the first strike entries some of the rooms would have to stand quite a while, it was decided that the room pillars would be more stable if the places were worked to the rise on the present and succeeding strike entries, rather than on the strike, as was the practice on 1st North. When full-retreat operation becomes effective, meaning that pillars will be mined immediately, a return to driving rooms on the strike may be possible—at least for a

while. Eventually, the thickness of the cover will increase to approximately 2,000 ft. at the western boundary, which perhaps will preclude driving on the strike at that point even if it prove feasible under lighter cover. In driving rooms on the strike, it is proposed to turn them off gangways driven up the pitch from the strike entry, using conveyors to bring out the coal and lower it to the main belt system.

Strike entries normally consist of an airway and a conveyorway, with a third car-loading heading for a maximum distance of about 500 ft. in from the main-dip manway. This loading heading is laid with two tracks to facilitate handling loaded and empty cars through the loading station and also for bringing in materials and supplies, which are unloaded and reloaded on small trucks at the foot of a supply slant leading up to the conveyorway. Cars are handled on the loading heading by a General Electric battery locomotive.

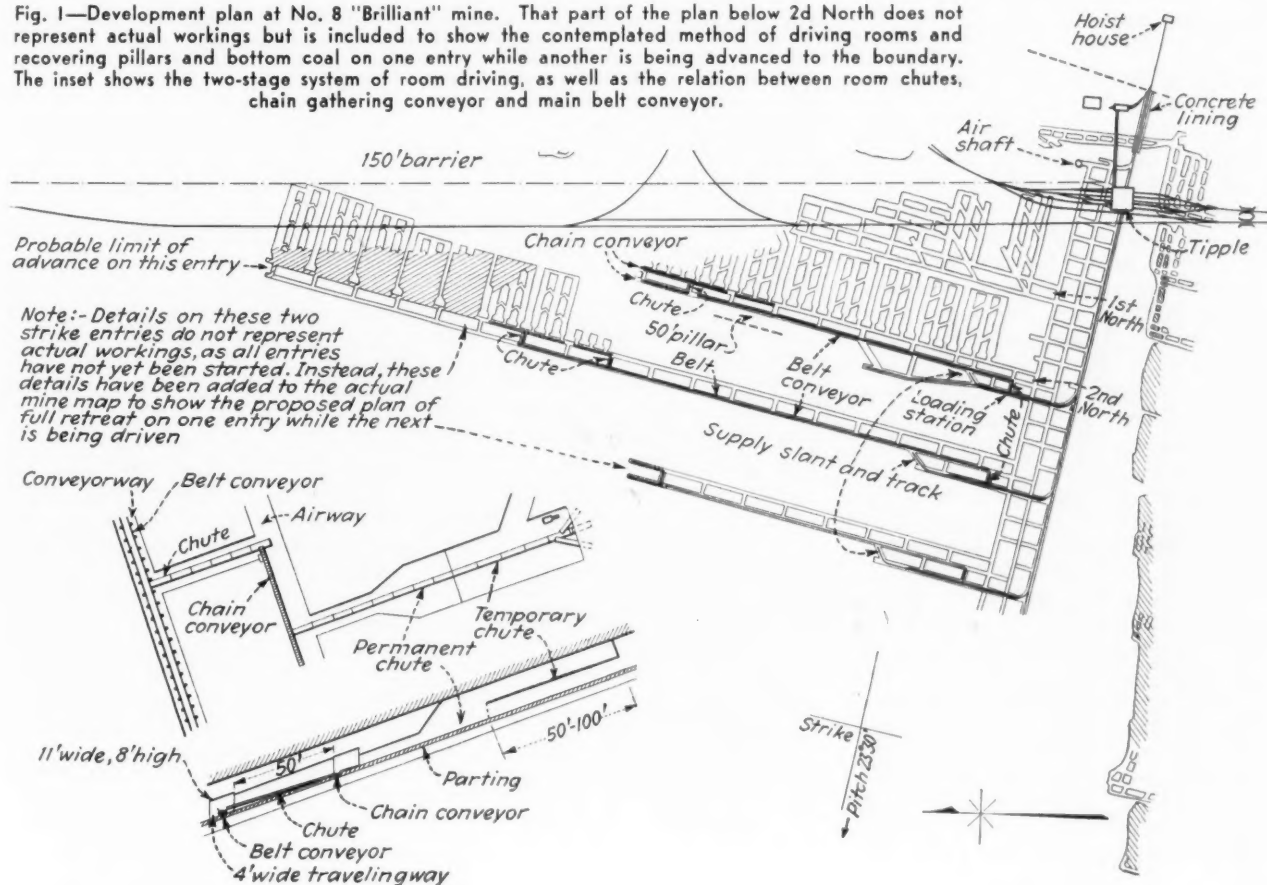
Airway and conveyorway are driven about 8 ft. high and 11 ft. wide, while the loading heading is made about 12 to 14 ft. high and 15 ft. wide to provide plenty of height for the loading chute so that cars may pass under it on the empty, or runaround, track and also so that

the discharge end of the chute will be at the proper loading height. A pillar 50 ft. thick, measured on the pitch, is left between all openings, and the distance from one strike entry to another is adjusted to provide for rooms about 325 ft. deep on the pitch, with a 50-ft. barrier pillar (measured horizontally) below the strike entry above.

Loading headings on strike entries are driven with a pit-car loader. Conveyorway and airway, however, are advanced with chain conveyors, shooting off the solid. Behind the chain units is a conveying system made up of one or more Jeffrey 52-B 36-in. sectionalized belt conveyors with a rated capacity of $4\frac{1}{2}$ tons per minute. Chain conveyors are of the 61-W type. Six-ply 42-oz. duck Goodrich belts with $\frac{1}{4}$ -in. rubber carrying cover and $\frac{3}{8}$ -in. reverse cover are used, and the conveyors, equipped with 35-hp. motors, are capable of extension in 60-ft. stages (120-ft. belt lengths) to approximately 1,500 ft. Chain conveyors, equipped with 15-hp. motors, are capable of extension to 300 ft.

In driving headings, and in fact in all work requiring their use, chain conveyors are laid along the rib on the lower side of the place. The upper chain conveyor in heading

Fig. 1—Development plan at No. 8 "Brilliant" mine. That part of the plan below 2d North does not represent actual workings but is included to show the contemplated method of driving rooms and recovering pillars and bottom coal on one entry while another is being advanced to the boundary. The inset shows the two-stage system of room driving, as well as the relation between room chutes, chain gathering conveyor and main belt conveyor.



work discharges into a chute in a crosscut, this chute delivering the coal to the second unit. The latter feeds the coal onto the belt conveyor. About three 1,500-ft. belts are required to reach from the loading station to the boundary at the present time. The outby belt in a series discharges into a chute again through a crosscut to the loading heading below.

Rooms are driven 25 ft. wide on 70-ft. centers. They are necked about 5 ft. high and 10 to 11 ft. wide for about 30 ft., the small neck being designed for easy sealing if it should become necessary. Airway and conveyorway are driven on the parting between the upper and lower benches and this parting also is the bottom of the room during its advance. Actually, however, the upper bench is taken in two stages, as indicated in Figs. 1 and 2.

The primary reason for this practice stems from the thickness of the upper bench (12 to 16 ft.), which would result in a dangerously high overhanging face if it all was taken at once.

Rooms are driven in groups of three with solid, or "blind," pillars between groups. The blind pillar was adopted so that in case of trouble on the inside, such as fire growing out of spontaneous combustion, etc., it could be closed off with only two seals.

Three Shifts Are Worked

With a working schedule of three shifts a day, mining in the upper and lower benches, respectively, is done on the first two, with a small clean-up and supply crew functioning on the third. On the first shift, a crew of five men work in each place when driving it up. Make-up of the crew is as follows: two cutters, who also drill, load holes and shoot; two loaders; and one chute tender. Timbering is a common task, and the usual plan is four rows in a 25-ft.-wide place, extended every cut. A Goodman 512 or Sullivan CR-3 double-drum 50-hp. cutter with 8½-ft. bar is kept in each place, along with a Chicago Pneumatic 472 coal drill. Cutters are equipped with Bowditch chains and bits and drills with "Coal-master" conveyor-type augers, heads and bits.

Face places are shot with six holes placed about as in Fig. 2. Where the soft shale appears over the coal, about 2 ft. of top coal is left and the top holes are drilled parallel with the roof at the natural parting. Where the shale is absent and the roof is the regular sandstone, all the

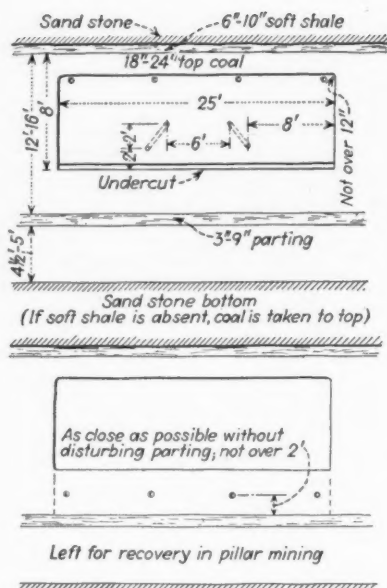
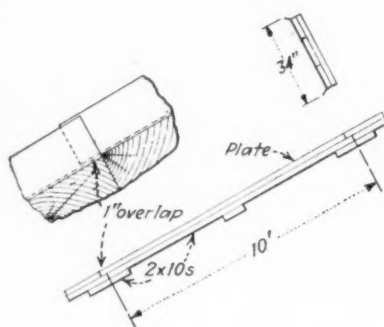


Fig. 2—Above is the drilling plan for a 25-ft.-wide face in the upper part of the upper bench at No. 8 mine; below is the drilling plan for breaking up the lower part.

coal is taken to the top. Bottom holes in face places are drilled upward and toward the center about as shown to break this part down and ease the burden on the top holes. Depending upon whether or not coarse coal and particularly lump is in demand, the coal is broken down with 1½x8-in. permissible or Cardox (2-100 shells). While permanent use of the latter awaits further experience, results to date indicate a yield of about 52 per cent 3-in. lump, compared with 40 per cent with the permissible used.

Shooting is done as required, on the working shift in view of the use of permissible or Cardox, and at least one member of every crew doing shooting, both first and second shifts, is a certified shot inspector. Before shooting, however, the main chute line is laid up into the undercut and two branch chutes are placed about as in Fig. 1, also partly under the cut. With this arrangement they are

Fig. 3—Details of permanent chute construction.



ready to carry away a large part of the broken-down coal.

Second-shift crews also consist of five men, who drill, shoot, load, timber and extend chutes in mining the bottom of the upper bench. Usually, this work follows the face work about 50 to 100 ft. The bottom is not cut, and to break it up, four holes are drilled parallel with the center line of the place about as in Fig. 2. The center two holes usually are shot first and the coal is loaded out. Then the permanent chute line is extended and the sides are shot into it whenever possible.

Two types of chutes—temporary and permanent—are employed at No. 8. Both are made of galvanized sheet—16-gage, concave in shape, for temporary use behind the face, and 10-gage, mounted on wooden frames, for the permanent lines. Temporary chute lengths are fastened together by tacking them to wood joiner blocks at the joints. Permanent chute sections, however, are butted one against another with only an overlapping of the sheet to prevent displacement. Width of the permanent sections is now 34 in., which has been found more satisfactory than the original width of 48 in. Section length is 10 ft. Construction details are given in Fig. 3.

It will be noted that chute tenders are included in the crews listed above. To prevent the coal from gaining too much momentum on its way down to the conveyor, checks, or batteries, made of posts laid across the chute are used at intervals.

5-Ton Cars Used on Slope

Two men are employed at the car-loading station in the loading heading—one trimming the cars and the other switching trips with the locomotive. In addition to these men and the room crews, certain utility men also are on the job. From the car-loading stations the coal moves to the surface in 5-ton solid-end Watt cars, 52 in number. The cars, all steel with wood floor members under the steel bottom, are featured by 14-in. Timken-bearing wheels and forged links and pins with safety catches. Height over the rail is 48 in. and the weight is 4,800 lb.

All underground equipment, except for the locomotives, operates on 230-volt a.c. at the motors (250 volts at the transformer taps). Underground transformer stations are the rule, using General Electric Pyranol units supplied with 2,300-volt current through a lead-sheathed cable (No. 2 wires). Secondary circuits are all non-metallic cables.

NEW CUTTER AND LOCOMOTIVE

+ Power Plant and Vibrating Screen

Put Truck Mine at Head of Class

WHEN a new power plant and a new low-vein locomotive were installed at the mine of the Jess W. Fickes & Son Coal Co., that property took the lead as to modern equipment among the underground truck mines in the vicinity of New Philadelphia, Ohio. Although the average production is less than 100 tons per day, the coal is undercut with a modern mining machine equipped with thin kerf bar, is hauled from working face to tipple by the new locomotive and is power screened to six sizes including a stoker product. Replacement of an old semi-diesel engine by a new modern full diesel unit cut fuel cost almost in half.

The mine portal and tipple are

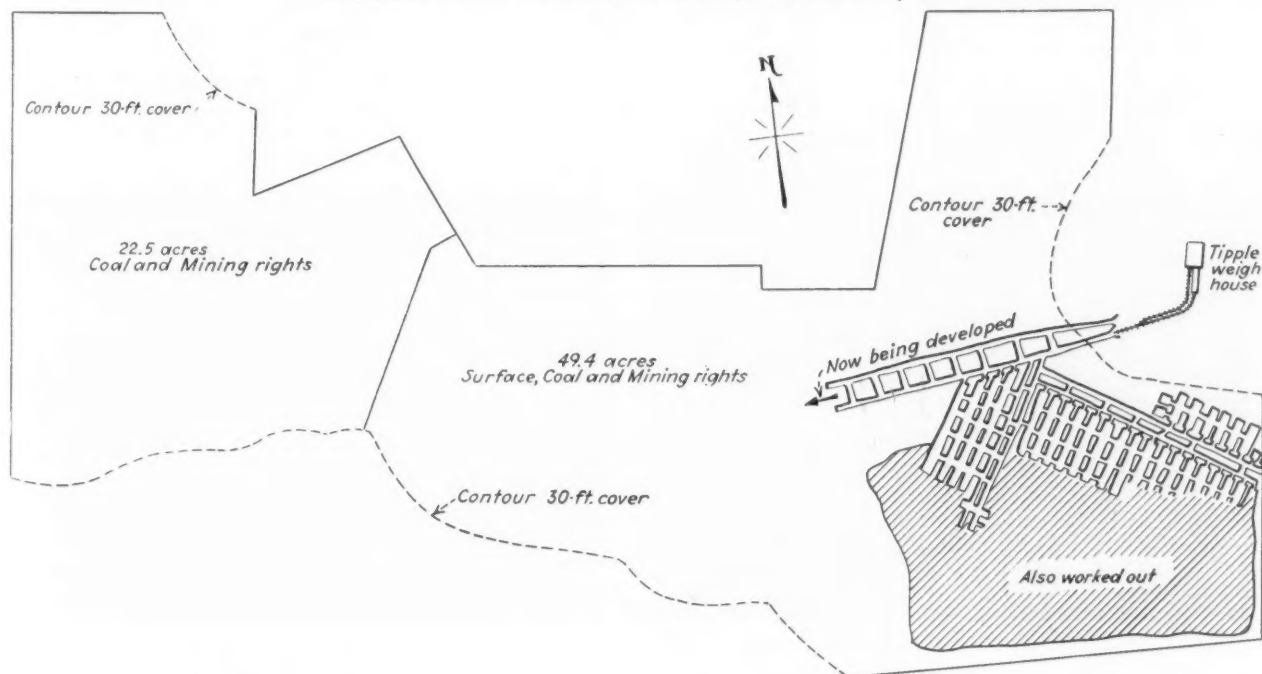
situated $\frac{1}{2}$ mile by private road from a graveled highway and seven miles southwest of New Philadelphia. This location is in Auburn Township, Tuscarawas County, and the distance to Cleveland by highway is 80 miles. Jess Fickes & Son opened the mine in 1935 with 49 acres held in fee and 22.5 acres of mineral rights adjoining. The seam, Ohio No. 6, lies nearly level and the opening is a drift through the outcrop. Average thickness is 42 in., the maximum 46 in. and the minimum 38 in.

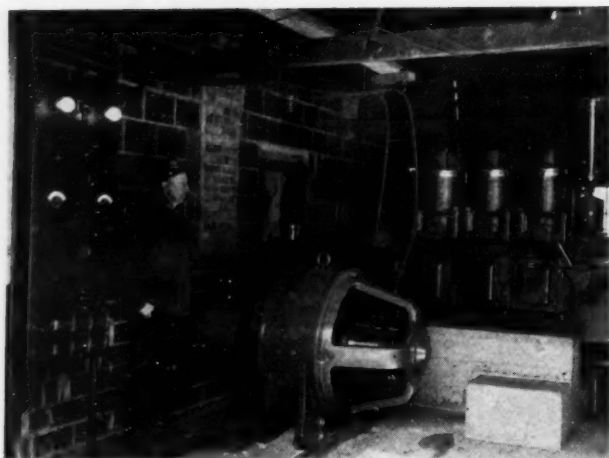
Cover averages approximately 125 ft. Immediate top is a strong slate and the bottom is fireclay. Impurities in the seam consist of a 1- to 2-in. continuous parting 6 in. from the bottom and some thin lenses of

irregular occurrence through the coal.

Headings are driven 12 ft. wide and the rooms 25 to 30 ft. wide on 38-ft. centers. Room depth is 200 ft. Track, underground, consists of 16-lb. rails on Bethlehem steel ties and that on the outside is built with 20-lb. steel on wood ties. No top is taken in the rooms or headings. Timbering in rooms consists of four rows of posts on 6-ft. centers. The coal is drilled with hand augers and shot with Austin pellet powder. All cleaning is done at the face and the tipple equipment does not include picking facilities. One section of the mine, to the left of the portal and from which the maximum haul was 1,500 ft., was completed this past season and development of a new

It is a drift mine in 42-in. Ohio No. 6 coal, which lies nearly level.





Left—This new power unit cut the fuel consumption almost in half. Right—Sam Aubihl, mine foreman, sends a bundle of steel ties into the mine with Motorman Elmer Meese. Dean Fickes, secretary-treasurer, stands at right.

section on the straight is now under way.

The cutting machine, which was purchased prior to acquiring the locomotive, is a Jeffrey Type 35L with 5½-ft. thin kerf bar using the Jeffrey Star bits. The undercut is made in the coal and the cuttings are loaded. To furnish 250-volt direct-current power for this cutter and also to operate a 3½-hp. fan motor, a 7-hp. vibrating screen motor and a 3½-hp. tippie conveyor motor, the power-house unit first installed consisted of a 55-hp. semi-diesel engine with V-belt drive to a 40-kw. generator.

In contemplation of installing electric haulage, the old power unit was replaced in September, 1937, with a brand new Fairbanks-Morse 90-hp. three-cylinder diesel Model 42-E driving a 750-r.p.m. Reliance 60-kw. 250-volt generator via Gates V-belts. The generator is one which was rebuilt by the Motor Repair & Manufacturing Co., of Cleveland. Fuel consumption of the old unit was 2.63 gal. per hour. On a test soon

after installation the new engine performed the same work with 1.71 gal. per hour, which, considering its higher rating, is a tremendous increase in efficiency of producing power.

This engine has 8¼x10½-in. vertical cylinders and operates at 450 r.p.m. For supplying air for starting the diesel there was purchased a new Type 30 Ingersoll-Rand 3x1¼x2-in. air compressor driven by a Type AD Wisconsin 2¼x3¼-in. single-cylinder gasoline engine. Both air compressor and engine are air-cooled. New equipment rather than rebuilt constitutes the control panel. Instruments are Weston and the circuit breaker with overload and low-voltage trips is an I-T-E.

Diesel cooling water is circulated through a 6½x6½x6½-ft. concrete sump situated outside the power house but using the building foundation as one wall. Make-up water, from a 230-ft. well, is so soft that no treatment is required. This well, with motor-driven pump, is situated beside the sump. During summer months

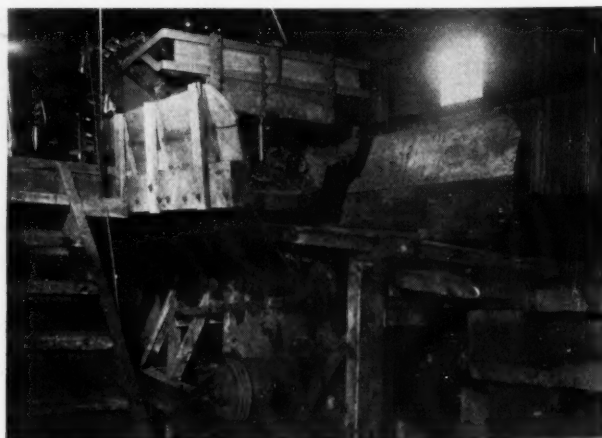
hot water returning from the engine is sprayed to the sump from a perforated vertical pipe, but during the winter the spray pipe is removed and replaced by a plain open-ended pipe.

The locomotive was purchased from the Jeffrey Manufacturing Co. in October, 1937. It is a 3½-ton unit of the single-motor type with axles connected by a Diamond No. 474 roller chain. The gage is 42 in.; the wheelbase, 37 in.; wheels, 24 in. in diameter; height over covers, 27 in.; height over trolley pole stand, 32 in.; and the over-all length is 12 ft. It is equipped with an automatic reel having 500 ft. of single-conductor cable. At truck mines in this section of the State it is unusual to have the locomotive equipped with a cable reel for operation away from the trolley wire.

The haul to the outside is a slight upgrade and a normal trip is 8 to 10 cars, but the locomotive can pull 17 up the grade and 22 on the level. The cars carry 1,800 to 2,300 lb. and are built with wooden bodies,



Scale and dump approach are protected against the elements by a steel-clad shed.



Cross-over, dump, reciprocating feeder and vibrating screen in the Fickes tippie.

lift endgates, plain bearings and Watt wheels and bumpers. Twenty-five of these cars constitute the equipment and the turnover is 3.4 times per day for the average production.

To date no pumping has been necessary in the mine. A siphon has been successfully applied to pull the water to the outside. The mine fan is a 42-in. disk type and its $3\frac{1}{2}$ -hp. motor has ball bearings. Both are Fairbanks-Morse manufacture and, like most other items of the machinery, were purchased new.

The tippie includes a mine-car scale, cross-over dump, vibrating screen and a 32-in. x 18-ft. flight conveyor for moving the lump sizes from the screen to the bins. Dumping and screening capacity is 200 tons per day. The vibrator is an Elwemco made by the Electric Welding & Machine Co., Wheeling, W. Va. Its original screen-cloth decks were replaced with Hendricks lip-screen plates. Storage is in seven bins of 25 to 50 tons capacity each and the sizes regularly available are $\frac{1}{2}$ -in. lump, 1-in. lump, 2-in. lump, $\frac{1}{2}$ x1 $\frac{1}{2}$ -in. stoker, 1 $\frac{1}{2}$ x2-in. nut, $\frac{1}{2}$ -in. slack, and mine-run. To provide shelter over the mine scale and dump approach, a shed 75 ft. long was added over the loaded track. Sides and roof are covered with Berloy open-hearth galvanized steel made by the Berger Manufacturing Co., Canton, Ohio.

"Cash-and-Carry" Sales

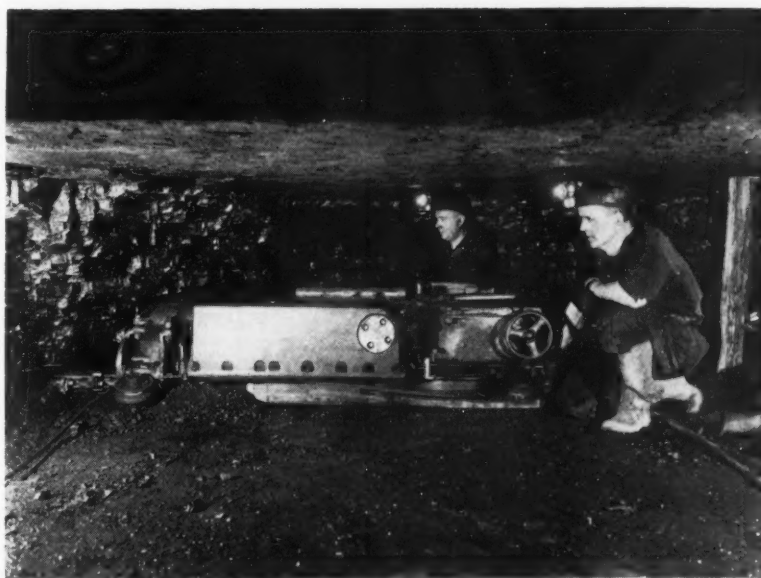
The coal is sold cash-and-carry over a new Howe 9x34-ft. platform truck scale of 15 tons rated capacity, but graduated to 18 tons. For any one day 140 tons has been the maximum sold, but during cold spells the scales have exceeded 100 tons for several consecutive days. Ordinarily the weighman leaves the scale office at 3:30 p.m., so no coal is sold after that nor at night unless by previous appointment.

The mine is worked one 7-hour shift and the men are members of the United Mine Workers. State compensation cost which the coal company must pay on their wages is the base rate of \$7 per \$100 of payroll. Instead of shutting down the mine during the summer it is operated three days per week if sales will permit.

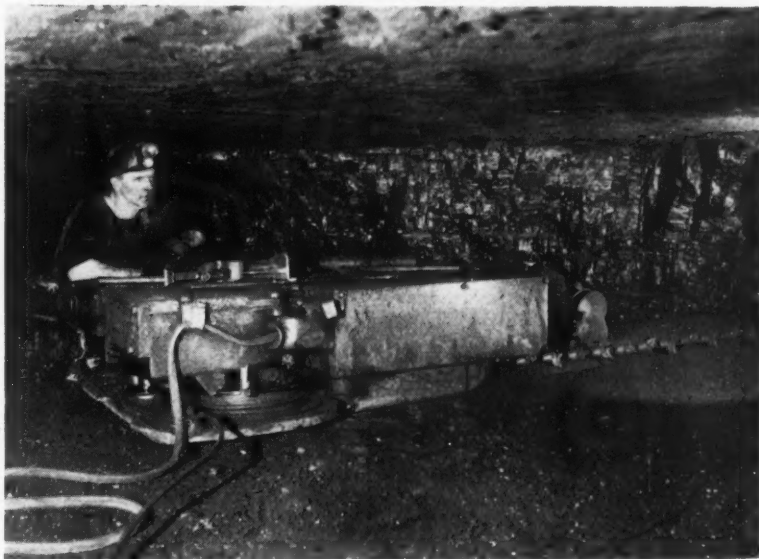
Jess W. Fickes, president and principal owner of the company, tends the weighing and selling. His son, Dean Fickes, who is secretary-treasurer, takes care of the power plant and tippie. Both of these men and also the mine foreman, Sam Aubihl, reside in New Philadelphia.



The tippie contains screening and storage facilities for seven sizes. Jess Fickes is standing back of the new single-motor locomotive.



Sumping in with the low-vein equipped with $5\frac{1}{2}$ -ft. thin kerf bar.



The low-vein cutter is equipped with thin kerf bar and Star bits.

Notes...FROM ACROSS THE SEA

AS A chain guard, as a means of reducing the quantity of fine dust both in the mine air and in the product, and also as a provision for delivery of bug dust to the rear of the undercutting machine, the "gummer" in Great Britain, seems to have come to stay, for on many counts it insures greater safety, improves the product, reduces demand for powder, power and maintenance, and increases efficiency.

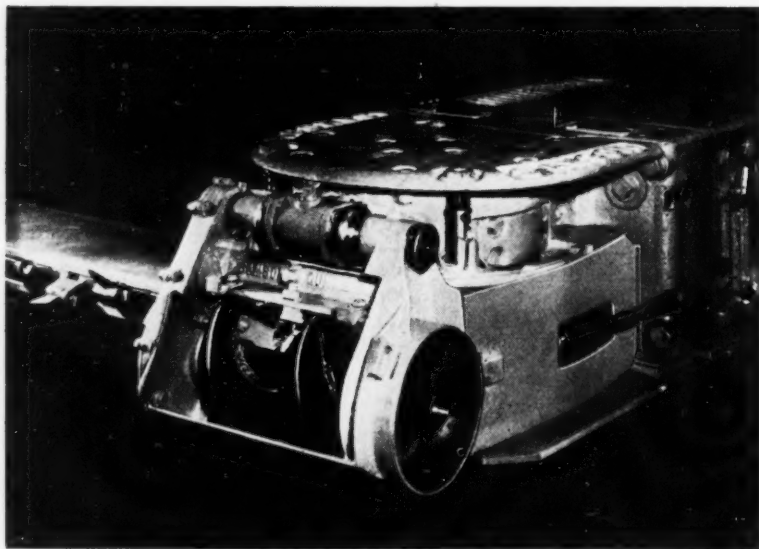
A "gummer" is a conveyor to remove "gum" or, as we would say, "bug dust," as fast as it is brought out of the cut by the cutting chain of an undercutter. The Hoy gummer was described in *Coal Age*, September, 1938, p. 47, and all the advantages there described apply aptly to the spiral gummer of Mavor & Coulson, with the added advantage that, with the latter equipment, a much needed guard is provided for the chains, and the equipment is more closely integrated with the undercutter, but, instead of transferring most of the gum to a face conveyor, it merely pushes it back to a point behind the undercutter where it is out of the way and ready for loading. The spiral is driven indirectly by the large bevel gear in the gear head of the undercutter, and can be detached or replaced in two minutes. It can be lifted clear for flitting without being taken off.

Various notable safety features are present in the gummer. Persons at the rear of the machine are protected against the moving bits of the chain. The only approach to the moving parts of the spiral is at one end, and there the movement is outward, thus the part of the person exposed to the spiral will be

pushed into safety, not dragged into danger. No shovel has to be used to clear the chain of bug dust and thus a source of jeopardy is removed. Both the shoveler and shovel are available for other work, and the shoveler is not exposed to the roof hazards of shoveling. As only an inch or two of bugdust is left on the floor, it is easy to set props, and they can be set promptly before the roof has time to work. As less dust is made, visibility is improved and the dust-explosion hazard is decreased. This equipment is being used in the Gin pit of Manchester Collieries, Ltd., at Walkden, Lancashire, England.

ACTIVATED carbon with a solvent recovery about 75 per cent as great as that of good commercial carbon has been made from the graded lump durains (attritus) of the Nottinghamshire, Derbyshire and south Yorkshire coal beds, declares Fuel Research (under the Department of Scientific and Industrial Research) and the Chemical Defense Research Department. Thus, the British hope to provide in quantity a material hitherto imported in part from abroad. Carbonized at 650 deg. C. (1,202 deg. F.) in full-scale retorts originally erected in Greenwich for experiments in low-temperature carbonization, the durains yielded a carbon as active as a coke prepared at 480 deg. C. (896 deg. F.) and its strength was greater. Activity of the product was measured by its ability to adsorb carbon tetrachloride in an air stream. In standard abrasive tests, the activated carbon had greater strength than coke prepared at 480 deg. C.

Spiral fits on machine and carries the bugdust back of the undercutter. Before making this illustration, the guard had been removed from the spiral.



Intense interest during the World War was shown in the collection of peach stones and coconut shells for the manufacture of activated carbon for gas masks, but the product also is used for the removal of sulphur from gases, for the adsorption of disagreeable odors in the manufacture of fertilizers and glue, for the recovery of fats and in the tannery and varnish industries.

BOTH infra-red and ultra-violet lamps are used in washhouses of the Sälzer-Amalie Colliery of the Krupp-Bergwerke Essen, in Germany, to compensate miners for the hours spent in the mine away from the healing and vivifying rays of the sun, according to *Kohle und Erz*. Violet rays are used in the washhouses of the mineral industries in this country and Canada, but the employment of infra-red rays in conjunction therewith is a new development. The men pass through corridors 40 ft. long between the rooms where they remove their street clothes and put on their mine clothes respectively and, as they walk sideways between railings, they are exposed front and back to the rays. This treatment is given twice a week, the length of exposure being gradually increased from 1 to 5 or 6 minutes. Because of the manner of progression, slow movement through the corridors is assured. Similar equipments are proposed for other mines.

DILIGENT exploration in the Soviet Union has laid bare so much coal that the U.S.S.R. now declares that its coal resources have passed the trillion mark and total 1,823,602,000,000 short tons, more than half as much as those of the United States, which stood in 1936 at 3,184,441,306,000 short tons. In 1913, Russia-in-Europe was said to have 66,255,000,000 short tons but in 1937 the estimate had risen to 125,551,000,000 short tons, an increase of 89.4 per cent. Similarly, Siberia had 191,667,000,000, but now is estimated to have 1,657,856,000,000 tons, an increase of 795 per cent.

About 9.1 per cent of the Russian coal is in Europe and 90.9 per cent in Asia; about 9.9 per cent of the coal is Carboniferous; 56.9 per cent is Permian; 23.4, Jurassic and Triassic, and 9.8, Tertiary.

COAL'S ability to create heat by combustion is, in actual practice, not altogether proportional to its "calorific," or "heating," value, to apply these latter terms in their accepted connotation. In determining the value of coal for use in a boiler with a flue temperature of 350 deg. F., Dr. E. S. Grumell, of the Imperial Chemical Industries, who recently attended the session of the American Institute of Mining and Metallurgical Engineers in New York, would deduct, under normal conditions, from the calorific value, as determined by the calorimeter, 0.1 per cent for each per cent of moisture in the coal and, because of increased loss of combustible in the ash pit, a further 0.33 per cent for each per cent of ash above 10 per cent; also, finally, 1 per cent more if the coal will cake. Screened coals tend to give higher efficiencies than unscreened. By taking the calorific values and making deductions, as Dr. Grumell has suggested, the relative available heat value of the several coals can be determined.

In a study reported by J. K. Thompson

and R. V. Wheeler to the Midland Institute of Mining Engineers, swelling characteristics ranged between $2\frac{1}{2}$ and 8 (B.S.S. 804), where 8 represents a fivefold swelling index. Yet, with sized coals, this swelling did not seem to the investigators to affect the efficiency of the coal. However, slack coal with a swelling index of 4 seemed to be preferable to slack coal of higher indexes.

In a firing of slack containing 9.7 per cent of moisture, which nevertheless was dry and dusty, the addition of 6 per cent of water removed the dust, even though it did not make the coal visibly wet, and yet

it decreased the loss of coal to ashpit and flues so much that this saving compensated for the loss of heat which resulted from the evaporation of the water.

From the foregoing determinations, it is proposed, therefore, to ignore the swelling character of the coal where clean, closely sized coals are used; to penalize slack 1 per cent as compared with closely sized coals of the same composition and to make a further deduction of 1 per cent when the swelling index of the slack exceeds 4.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Report of the Committee on Prices in the Bituminous Coal Industry, the Conference on Price Research, National Bureau of Economics Research. 144 pp., 5 $\frac{3}{8}$ x 9 $\frac{1}{4}$ in.; paper.

A painstaking and accurate study of the price structure of the coal industry by two quite competent committees, one active and the other advisory. Though this is perhaps a rather footless endeavor, and one which ends with no conclusions, the perusal of this volume will give the reader a better understanding of the perplexity that faces any commission that would attempt to set prices.

The fact that there is no best coal among those available in any area because the needs and demands of the user are so variant is recognized by the authors. Equally important is the fact that further changes are inevitable in burning and mining equipment and, therefore, new disturbing elements will arise to modify the price structure. A valuable table in the book is one showing the dates on which certain statistical data begin, and sometimes cease, to be available and one showing the markets for which price data are collected and the publications which print them.

Smoke Abatement, Selections from Papers by O. P. Hood, U. S. Bureau of Mines. I. C. 7016; 23 pp.; mimeograph.

J. F. Barkley has collected these slingstones for the war against smoke and fly dust from the armory of the late O. P. Hood. The latter regarded clean air as a fourth and most neglected item in the quinquivium of health—clean water, clean streets, sewage purification, garbage removal and clean air—the last, a moral issue in which only about a third of the citizenry can be expected to become interested.

Small domestic stokers promise some relief from the ill-being and lack of health accompanying smoke, which cuts off the healthful short rays in sunlight. The solution lies not so much in attack-

ing smoke-making as in banning the use of equipment likely to cause smoke emission. The six-point Hood plan for successful smoke abatement concludes the circular—and it does not ban high-volatile coals.

Effect of Sulfur Compounds in the Air on Various Materials, by L. R. Burdick and J. P. Barkley, U. S. Bureau of Mines. I. C. 7064, 9 pp.

This review of already published investigations indicates the deterioration of cement, stone, metals, paint, leather, paper and cloth as the result of the emission into the air of sulphur compounds. The effect on organic materials perhaps is as harmful as on rock products and metals.

American Standard Safety Code for the Protection of Heads, Eyes and Respiratory Organs. National Bureau of Standards, Handbook H24, 95 pp., 5x7 $\frac{1}{2}$ in. Price, 15c.

This code replaces that published in Handbook H2. It covers, of course, not only equipment used by men in mining operations but apparatus used by those needing such protection in industry or even in non-industrial operations such as fire-fighting.

Allaying Dust in Bituminous-Coal Mines With Water, by D. Harrington and seven others. U. S. Bureau of Mines, Technical Paper 593, 55 pp.; paper. Price, 15c.

This publication reports studies on the actual lowering of dust count by use in several ways of water at the face, data regarding water used, cost of lines and laying of same, men required for work, size of pipe used, method of application, laws and company regulations.

Too little water on cutter bar may merely stir dust, increasing dust count. Authors quote general opinion that water

acts as a lubricant. Perhaps it does, but probably increased cutting speed attained with water is due to the better cutting resulting from action of bits kept cool by spray, as is indirectly suggested. Hot bits lose temper and become dull. Allaying of dust by water reduces explosion hazards, promotes health, increases efficiency and comfort of workers, improves morale and lowers labor turnover, increases visibility, thus reducing accidents.

Requirements for Ventilation—Alabama Mining Law, by Frank E. Cash, U. S. Bureau of Mines. I. C. 7068, 5 pp.; mimeograph.

Alabama demands that in all mines, except those which are non-gassy, a record of the methane content at or near the last crosscut in each working entry (whether split or continuous ventilation is used) shall be sent monthly to the chief mine inspector. That State was the first, and at present is the only State requiring that methane content of the ventilating current be determined at specific points in gassy coal mines and data thus obtained be furnished the inspection department not less often than every 30 days.

Under the 1937 amendment to the mining law of Pennsylvania the inspection department can request and obtain the methane content of mine air periodically. By a malicious mischance, Alabama's average gas-fatality rate has gone up since the provision quoted was made, because 34 were killed in one explosion in 1937, though since the report was made at first dependent of the will of the chief inspector and finally mandatory, four several years have shown records entirely free of fatalities from gas explosions.

How to Buy, Sell and Burn Coal, by Thomas A. Marsh, Chicago. 97 pp., 4 $\frac{1}{2}$ x6 $\frac{1}{2}$ in. Price, \$1.

Few authorities on combustion are more highly regarded than Tom Marsh. In the language of the street, Mr. Marsh discusses how to select fuel for manufacturing, commercial and residential heating plants; how to cut fuel bills, how to stop smoke, how to increase efficiency, how to raise more steam and how to "read fires." Tabular matter relates causes to remedies for all the several defects of operation of boilers and stokers.

Graphic Routes to Greater Profits by J. W. Esterline. Esterline-Angus Co., Indianapolis, Ind. 320 pp., 8 $\frac{1}{2}$ x11 in.; fabricoid. Price, \$3.

Application of graphic charts to multifarious problems of industry receives exemplification in over 250 case studies, introduced by chapters on the high cost of inefficiency, the interpretation of graphical representations and the classification of industrial problems. The studies are classified as power, machine, process, human and product questions. Ten of these relate directly to the operation of mines, but others exemplify ways in which graphic charts will aid in the solution of mining problems and reveal losses and their causes which otherwise might not even be suspected.

SUMMED UP - THE STORY OF THE PERFECTED ELMORE CENTRIFUGAL DRYER IS

"A Way to Save Waste and Make it Pay"

ELMORE DRYERS have done a cost saving job for more than twenty years as testified to by the Elmore Dryers in use for periods of that length. Find out how the new perfected ELMORE not only replaces more costly facilities, but also how it reduces moisture and ash content and recovers coal from slurry to effect large daily savings—learn how you get more tonnage per day and cut costs in doing it.

THIS QUESTION MAY HAVE OCCURED TO YOU
**WHY DOES AN ELMORE CONTINUOUS
CENTRIFUGAL CLEAN FINE COAL?**

GET LOWER OPERATING COSTS

When you

**DRY YOUR 1' to 0 WASHED
COAL OR RECLAIM THE
SLUDGE FROM YOUR WASHERY**

**CONTINUOUS CENTRIFUGAL DRYER AND
SLUDGE RECLAIMER**

- 1 Requires no more labor to operate than an ordinary electric motor.
- 2 Operates at a much lower maintenance cost per ton of material processed than any other dryer of similar capacity—AND REQUIRES NO HEAT.
- 3 Saves large initial investment for equipment and floor space.
- 4 Deliquesces solid materials at a lower cost than any other known method.



Saving Money in an Indiana and an Illinois Mine.
One of our continuous centrifugal dryers in Indiana is now handling up to 100 tons of coal per hour. Authorities have shown it reduces 25 to 30 tons moisture in it when the Centrifugal removes the coal other processing methods.

Another of our continuous centrifugal dryers in Illinois is processing 5 to 10 tons of coal at the rate of 15 tons per hour. This coal enters the dryer with 25 to 30% moisture. Based on an average of 30 tons, wet continuous centrifugal removes all but 2 to 3% of the free moisture.

HOW YOU CAN INCREASE YOUR PROFITS
The cost and trouble of disposing of surface can be entirely eliminated. The sludge can be reclaimed and turned into a valuable product at a very low cost. The dried material is immediately available for use in the mine. One continuous centrifugal dryer of moderate capacity of ash burning material and reduces the ash and moisture content in a very low percentage. It will dry 1 to 5 washed coal in large tonnage to such a low moisture content that it will not freeze.

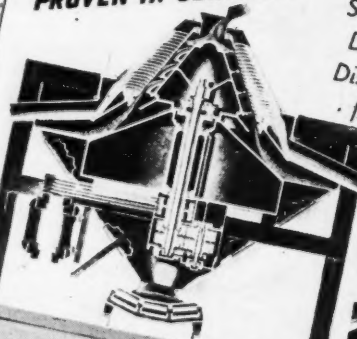
We will gladly furnish complete information on request.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.
1311 PRESIDENT ST. ST. LOUIS, MO.

CONTINUOUS CENTRIFUGAL DRYER AND SLUDGE RECLAIMER

PROVEN IN SERVICE!

*Solves Problems of
Drying Coal and
Disposal of Sludge
from Washery*



**GIVES YOU A NEW AND SURE WAY
OF SAVING MONEY**

A perfected operating principle now practically eliminates the cost of coal and trouble of disposing of the sludge—now the sludge is reclaimed and turned into a valuable product at very low cost. The Continuous Centrifugal requires no more labor to operate than an ordinary motor—it operates at a much lower maintenance cost per ton of material processed than any other dryer. It has a large capacity and requires no heat—it saves large initial investment for equipment and floor space—it deliquesces solid material at a lower cost than ever before possible. Modern industry demands this continuous operation—write today for complete facts.

**RESULTS OBTAINED
BY ONE USER**

The Standard Power Company of St. Louis, Mo., operating at the Washburn Washery, has installed a Continuous Centrifugal Dryer and Sludge Reclaimer. The results obtained are as follows: 1. The sludge is reclaimed and turned into a valuable product at very low cost. 2. The Continuous Centrifugal requires no more labor to operate than an ordinary motor. 3. It operates at a much lower maintenance cost per ton of material processed than any other dryer. 4. It has a large capacity and requires no heat. 5. It saves large initial investment for equipment and floor space. 6. It deliquesces solid material at a lower cost than ever before possible. 7. Modern industry demands this continuous operation—write today for complete facts.

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CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC., ST. LOUIS, MO.

OPERATING IDEAS

From

Production, Electrical and Mechanical Men

Mechanical Means of Picking Flats From Coal

Flat pieces of coal, often with thin flakes of bone or slate on their top and bottom beds, give much trouble in the Northern Anthracite Field, and in less degree in other parts of the anthracite region, because they have a bad appearance. Usually they are borderline coal, and too many of them in the commercial product would raise the ash content unduly. For these reasons, they are frequently passed through the breaker a second time, so that the bone may flake or be rubbed off, or they are sent to bone rolls, so that, in breaking them, the bone may peel off or be broken off the coal, or at least may retain so little coal (to act as a life buoy in recleaning) that the combination of bone and coal will be rejected by the mechanical equipment, leaving the rest of the coal bone-free and, therefore, suitable for merchandising purposes.

Many designs of "flat pickers," as they are termed, have been made. A type of flat picker in use at No. 9 breaker of the Anthracite Coal Co., Hughestown, Pa., is made by cutting (with a blow torch, in line across a blank plate, later to be used

as a section of a shaker chute) several cuts resembling pairs of facing, and almost meeting, channels with the longer line of each channel paralleling what will be the lower edge of the plate when set in the shaker chute.

The pieces of plate, or slats, thus almost freed can be revolved a few degrees on the material left between the channels as an axis so that the shaker chute will resemble a partly opened but almost horizontal venetian blind. Through the holes thus created in the plate, pieces of coal can fall if thin enough to pass under the upturned lip of the slat. When coal comes down the shaker on the back movement of the latter, it passes over the tipped-up flat and falls on the far side but does not fall in the hole, but beyond it. However, the forward motion of the shaker, not being immediately communicated to the coal, causes it to travel back relative to the shaker, and if the coal is so flat that the lip of the projecting slat does not restrain it, the flat coal slides backward into the hole.

As the slats are almost continuous across the shaker and as a series of them lie as traps in the line of travel, the flats have no opportunity of escape. They might slide too far past one slat-protected

hole or perhaps past more than one of them in any given row because the backward movement is delayed, but they could not pass all of them. Pipes are welded longitudinally to the screen plate so that its strength, though greatly diminished by much cutting, will be reestablished.

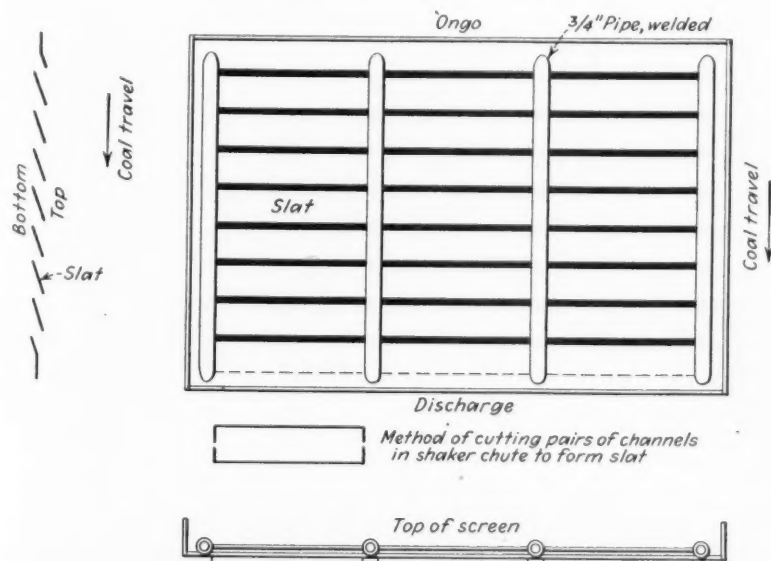
Projecting for Ventilation Means Dollars Ahead

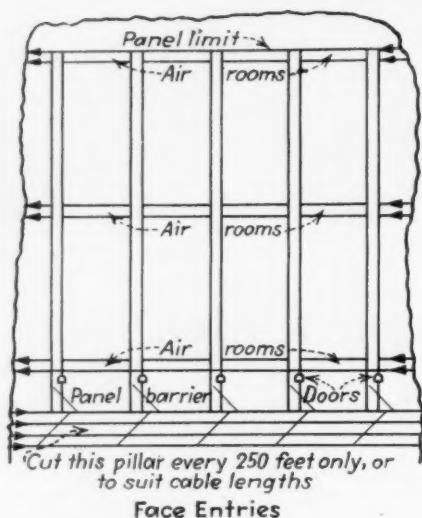
Provisions for an ample volume of air in making mine projections can have an important effect on the cost of coal, declares E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky. Larger and shorter airways are well-recognized methods of reducing ventilating cost. In this connection, as shown diagrammatically in the accompanying sketch, it is well worth while in most cases to drive the first pair of rooms on butt or room entries through for ventilating purposes, thus making the barrier pillars along the face entry the permanent division for the ventilation of the section. Such rooms have another major advantage: shortening the path of the air current. Air rooms also may be driven wider than headings or even other rooms, thus cutting down velocity and pressure. Pillars between air rooms may be made very thin—so thin, in fact, that they need never be mined.

The projection shown in the sketch also eliminates all doors on the entry, or main haulway. Chain pillars on entries need be cut through only frequently enough to permit machines to cross from one to another during advancement without any addition to their regular-length cables. This reduces the number of stoppings, as well as leakage, etc. Instead of on the face entry, doors may be placed more conveniently on the room entries just below the air rooms. Then, as additional air rooms are driven in advancing the room entries, the doors may be moved up to these air rooms, as indicated by the letters "d" in the sketch, thus shortening air travel.

With his doors off the main haulways, his air travel shortened, his leakage losses reduced, his velocity slowed down by providing larger openings, his input to working sections improved, his inherent water-gage reduced, and his fan-current consumption decreased, in addition to his

Picks flaky pieces out of traveling coal.





Showing diagrammatically how doors may be moved off the haulage entry and air travel shortened by driving air rooms.

saving in running time, the mining man will find himself dollars ahead by projecting for ventilation, Mr. Smith concludes.

Cable In 844-Foot Borehole Is Suspended by Copper

At a new borehole feeding an underground d.c. substation in Mine No. 3 of the C. H. Mead Coal Co., East Gulf, W. Va., 858 ft. of power cable is suspended by the conductors. C. L. Brown, electrical engineer for the coal company, explains that a representative of the cable manufacturer was reluctant to recommend a conductor suspension of that length, but that he (Mr. Brown) felt certain that the factor of safety was suffi-

Aluminum line wires and an 858-ft. borehole cable supported by the three conductors.



cient to warrant the installation. Steel-core aluminum wire was used on the pole line built to the site.

The borehole itself, 844 ft. deep, was drilled to 8 in. and in it was installed a 6½-in. steel casing grouted in place without centering spacers. Experience in the locality indicates little chance of acid water in the strata and therefore corrosion is of small concern. The cable, size No. 1 copper conductor, made by the General Electric Co., is insulated for 5,000 volts and operates at 4,000 volts, three-phase, 60 cycles. Conductors are copper shielded, and the insulation consists of tellurium and Versatol, and the outer jacket protection is a double braid.

As shown in the accompanying illustration, the entire weight is taken by the three strain insulators tied to the lower crossarm. The wood clamp above the end of the casing takes the spacing strain from the insulation and from the waterproofing at the point where the conductors fan out from the cable.

General Electric pellet arresters are installed on the upper crossarm and for additional lightning protection the same type arresters in combination with a capacitor were installed down in the mine ahead of the transformers. This substation contains two Type HCC synchronous converters, one a 150-kw. and the other a 200-kw. Starting equipment is manual, but the d.c. side is protected by a 3,000-amp. automatic reclosing breaker.

The steel-core aluminum pole-line wires feeding the borehole cable are No. 3/0 and in current capacity are equivalent to No. 0 copper. This ASCR (aluminum-steel-core-reinforced) wire now is being used for all 4,000-volt pole-line extensions at the C. H. Mead mines. Mr. Brown reports a saving of 50 per cent on conductor cost, as well as other savings because the lighter weight allows the use of lower-cost poles and line hardware and less labor is required for installation.

Air-Lift Installations Aided By Arc-Welding of Parts

In addition to other applications in mine drainage, arc-welding also can be applied to the construction of air lifts, states Paul F. Erch, mechanical draftsman, Glen Alden Coal Co., Scranton, Pa., in a paper receiving honorable mention in the \$200,000 Award Program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio (*Coal Age*, October, 1938, p. 90). In the case of one air lift for dewatering some completely filled workings, says Mr. Erch, "a shot-drilled 14-in. borehole was driven down to the vein in question from the vein above, as shown in the accompanying illustration. A 10-in. steel casing pipe then was placed in this hole, extending to the floor of the vein, but was not grouted in. A 10-in. drill then was operated through this pipe to drill a 10-in. hole about 70 ft. into the rock underlying the lower vein. When this drilling was completed the 10-in. pipe was withdrawn and then replaced with strainer piece at the bottom end. This strainer piece had arc-welded to its lower end a

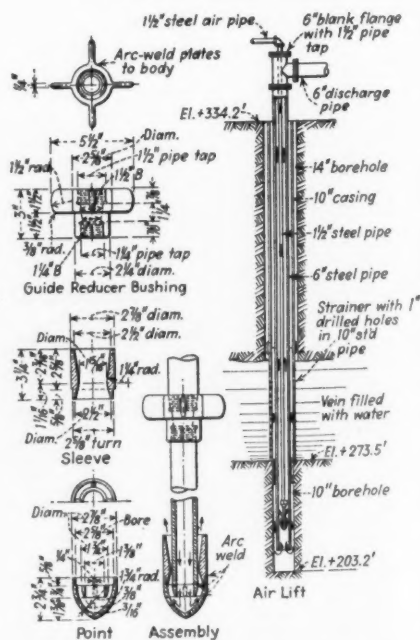
By the Horns

Mining men must be prepared to grab trouble by the horns if they don't want the horns impaling them. Horn-grabbing, however, is a lot easier when the man on the spot knows how. We run this department to help operating, mechanical, electrical and safety men build up their ability in that direction. Naturally, one who has faced the horns can do the best job of telling what grip to use. So we urge you to send in your solutions to the problems you have encountered. They may help the next man down the line. Write them out, and inclose a sketch or photo if it will help make them clearer. For each acceptable idea, *Cool Age* pays at least \$5.

1-ft. section of 9½-in. O.D. pipe to enter the top of the 10-in. borehole. The strainer permitted water from the vein to freely enter the 10-in. borehole which was intended as a well in which to operate an air lift, the depth of 70 ft. in this well giving sufficient submergence to permit efficient air-lift operation for dewatering the entire vein.

"As shown in the illustration, the air lift employed on this job was of much the usual type, except as to the foot piece, which was designed on the venturi principle for the most efficient diffusion of air into the water to form the air-and-water emulsion so essential to successful performance of an air lift. The foot piece proper (see illustration) was made of four pieces of bronze arc-welded together. While it might have been possible to cast this in one piece, there would not have been the desired accuracy of shape or dimensions

Air-lift parts and lift installed.



"Take a letter, Miss Johnson..."

MINE OFFICE
CENTRAL EUREKA MINING CO.
SUTTER CREEK, AMADOR CO., CALIF.
JAMES SPIERS, SUPERINTENDENT

SAN FRANCISCO OFFICE
111 SUTTER STREET
ROOM 2012

SUTTER CREEK, CALIF. April 19, 1939

The Electric Storage Battery Co.,
6150 Third Street,
San Francisco, California.

Gentlemen:

In 1930 we started using storage battery locomotives. We investigated the merits of various types of batteries at that time and were convinced that your Exide-Ironclad battery, with its special features of construction, was one we could depend on for good service at a reasonable cost. We therefore selected Exide-Ironclads.

Our eight years of experience with these batteries have proved that we made no mistake, as they have given us splendid service, performing their work day in and day out without breakdowns or any major repairs. They have substantiated in every respect your claims of high power ability, high efficiency, great ruggedness and long life. As additional locomotives were required, we added Exide-Ironclad batteries to our fleet, and now have a total of six in service.

The first of these batteries replaced gave 66 months life. The second gave 71 months life. The service which your Exide-Ironclad batteries and your company have rendered us has been highly satisfactory in every respect and we take pleasure in sending you this word of appreciation.

Very truly yours,

James Spiers, Supt.

**Exide
IRONCLAD
BATTERIES**

With Exide MIPOR Separators
"MIPOR," Reg. U. S. Pat. Off.

BY their performance in underground haulage, Exide-Ironclad Batteries have shown users that they can expect the type of service this letter describes. That is why more Exide-Ironclads are used in underground service than all other makes of batteries combined. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto



or the smooth finish in the cored spaces. Assembly of the parts by other means than arc-welding likewise would have been more expensive and more cumbersome. Arc-welding was employed also in the construction of the reducer guide bushing. The performance of this device has been highly satisfactory."

Horsepower Ratings Fixed For Leather Belts

To meet the need for the establishment of leather-belt ratings by some recognized authority, the American Leather Belting Association, New York City, has just published its new horsepower rating tables. These tables, declares L. H. Skougar, research engineer for the organization, make it possible for the designer and purchaser to set up their own specifications rather than segregate them from a number of recommendations and choose without any other basis to rely upon than the repre-

sentations of an individual who might be competitively involved.

The association tables, Mr. Skougar declares, are based on the performance of modern and up-to-date belting. Also, they are not based on one particular authority's theory but rather on a correlation of scientifically measured tests and field data. Table I lists the horsepower-transmission capacities of belts 1 in. in width at varying speeds, using the same large-size pulley throughout the tests. These tests were run at Cornell University by Ralph Jones, using the latest available type of equipment. All variables were measured instead of using any theoretical short cuts and computations. The figures in Table I do not represent peak-load ratings but rather are based on proper tensions and factors of safety so that when corrected in accordance with the factors given in Tables II and III a properly designed drive will result. It will be noted that the horsepower transmitted per inch of width increases with the speed of the belt.

With the data in Table I developed it was necessary to establish factors for the variables introduced, such as changing the effective area. The same tests therefore were run with varying pulley diameters and centers, resulting in the correction factors given in Table II. It will be noted that in the cases of gravity idlers and pivoted motor bases the factor for center-line distances of 25 ft. and over can be substituted for the effect of controlled tensions in pivoted bases and the increased effective area of gravity idlers.

The requirements of various industries often introduce adverse conditions that must be taken into consideration, and the values of these conditions cannot be determined from the factors as represented in a laboratory test. As an example, it is necessary to belt a drive for the peak loads that will be encountered. The name-plate rating of a motor, Mr. Skougar points out, is not a true indication of the peak loads that may be met and the correct overload

TABLE III—SERVICE-CORRECTION FACTORS

Atmospheric Condition	Clean, scheduled maintenance.....	1.2
	Normal.....	1.0
	Only, wet or dusty.....	.7
Angle of Center Line	Horizontal to 60 deg. from horizontal	1.0
	60 to 75 deg. from horizontal	.9
	75 to 90 deg. from horizontal	.8
Pulley Material	Fiber on motor and small pulleys....	1.2
	Cast iron or steel.....	1.0
Service	Temporary or intermittent.....	1.2
	Normal.....	1.0
	Important or continuous.....	.8
Peak Loads	Light, steady load such as: steam engines, steam turbines, diesel engines and multi- cylinder gasoline engines.....	1.0
	Jerky loads, reciprocating machines, such as: normal-starting-torque squirrel- cage motors, shunt-wound d.c. motors, and single-cylinder gasoline engines.....	.8
	Shock and reversing loads, full voltage start such as: wound-rotor (slip-ring) motors, synchronous motors.....	.6

TABLE I—RATED HORSEPOWER PER INCH OF BELT WIDTH, AMERICAN LEATHER BELTING ASSOCIATION *

(Always correct values in this table by the factors in tables II and III)

Belt Speed, Feet per Min.	Single-Ply		Double-Ply				Triple-Ply	
	*11/64 In.	*13/64 In.	*18/64 In.	*20/64 In.	*23/64 In.	*30/64 In.	*34/64 In.	
	Med.	Heavy	Light	Med.	Heavy	Med.	Heavy	
600	1.1	1.2	1.5	1.8	2.2	2.5	2.8	
800	1.4	1.7	2.0	2.4	2.9	3.3	3.6	
1000	1.8	2.1	2.6	3.1	3.6	4.1	4.5	
1200	2.1	2.5	3.1	3.7	4.3	4.9	5.4	
1400	2.5	2.9	3.5	4.3	4.9	5.7	6.3	
1600	2.8	3.3	4.0	4.9	5.6	6.5	7.1	
1800	3.2	3.7	4.5	5.4	6.2	7.3	8.0	
2000	3.5	4.1	4.9	6.0	6.9	8.1	8.9	
2200	3.9	4.5	5.4	6.6	7.6	8.8	9.7	
2400	4.2	4.9	5.9	7.1	8.2	9.5	10.4	
2600	4.5	5.3	6.3	7.7	8.9	10.3	11.0	
2800	4.9	5.6	6.8	8.2	9.5	11.0	12.1	
3000	5.2	5.9	7.2	8.7	10.0	11.6	12.8	
3200	5.4	6.3	7.6	9.2	10.6	12.3	13.5	
3400	5.7	6.6	7.9	9.7	11.2	12.9	14.2	
3600	5.9	6.9	8.3	10.1	11.7	13.4	14.8	
3800	6.2	7.1	8.7	10.5	12.2	14.0	15.4	
4000	6.4	7.4	9.0	10.9	12.6	14.5	16.0	
4200	6.7	7.7	9.3	11.3	13.0	15.0	16.5	
4400	6.9	7.9	9.6	11.7	13.4	15.4	16.9	
4600	7.1	8.1	9.8	12.0	13.8	15.8	17.4	
4800	7.2	8.3	10.1	12.3	14.1	16.2	17.8	
5000	7.4	8.4	10.3	12.5	14.3	16.5	18.2	
5200	7.5	8.6	10.5	12.8	14.6	16.8	18.5	
5400	7.6	8.7	10.6	12.9	14.8	17.1	18.8	
5600	7.7	8.8	10.8	13.1	15.0	17.3	19.0	
5800	7.7	8.9	10.9	13.2	15.1	17.5	19.2	
6000†	7.8	8.9	10.9	13.2	15.2	17.6	19.3	

MINIMUM PULLEY DIAMETERS

Belts Under 8" Wide	3"	5"	6"	8"	12"	20"	24"
	5"	7"	8"	10"	14"	24"	30"
Belts 8" and Over Wide	These are the minimum allowable pulleys for the above thickness belts.						

* See Table IV. † For belt speeds over 6,000 f.p.m., consult a leather-belt manufacturer.

TABLE II—CORRECTION FACTORS FOR CENTER DISTANCE AND SMALL PULLEY DIAMETER

Diameter Small Pulley, Inches	Center Distance in Feet															
	Up to 4'		6'		8'		10'		12'		15'		20'		25' and Over	
	Tight Side		Tight Side		Tight Side		Tight Side		Tight Side		Tight Side		Tight Side		Tight Side	
	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below
3.....	.45	.45	.46	.47	.47	.48	.47	.49	.48	.50	.49	.52	.48	.54	.48	.55
4.....	.53	.53	.54	.55	.55	.57	.56	.59	.57	.61	.58	.63	.59	.65	.59	.66
5.....	.59	.59	.60	.62	.62	.64	.63	.66	.63	.68	.65	.70	.66	.72	.66	.74
6.....	.62	.62	.63	.65	.65	.68	.66	.70	.67	.72	.68	.74	.69	.76	.70	.78
8.....	.66	.66	.67	.69	.69	.72	.70	.74	.71	.76	.72	.78	.73	.80	.74	.82
10.....	.68	.68	.70	.71	.71	.74	.73	.77	.73	.79	.75	.81	.76	.83	.77	.85
12.....	.70	.70	.72	.74	.73	.77	.75	.79	.76	.81	.77	.83	.78	.86	.79	.88
15.....	.73	.73	.74	.76	.76	.79	.77	.82	.78	.84	.80	.86	.81	.89	.82	.91
18.....	.75	.75	.76	.78	.78	.81	.79	.84	.80	.86	.82	.89	.83	.91	.84	.93
24.....	.77	.77	.79	.81	.81	.84	.82	.87	.83	.89	.85	.92	.86	.94	.87	.96
30.....	.79	.79	.81	.82	.82	.86	.84	.89	.85	.91	.87	.94	.88	.96	.89	.98
36.....	.80	.80	.82	.84	.83	.87	.85	.90	.86	.92	.88	.95	.89	.98	.90	1.00

Consider gravity idler and pivoted motor drives with tight side of the belt next to the pivot point as having 25-ft. centers. For pivot base drives where tight side of the belt is away from the pivot point, do not use these tables but consult a leather belt manufacturer.

TURBINE OIL SYSTEMS ONLY ONCE

● **MANY** operators will probably doubt that. Records that Nonpareil Turbine Oil has made in hundreds of turbines throughout the Midwest may be hard for you to believe until you've tried this different turbine oil yourself.

At the Blandin Paper Company at Grand Rapids, Minnesota, for instance, A. J. Kull, Chief Engineer, writes:

"It is now seven and one-half years since we cleaned our turbine oil system and changed to Nonpareil Turbine Oil. During this period the oil cooler

"During this period the oil cooler has been opened only once and we

found it almost as clean as when the oil was first put in service.

"We shall be pleased to recommend this oil to any engineer who calls on us for our recommendation."

It is almost eight years since Mr. Kull has cleaned a turbine oil system or had the messy job of changing oil. Think of the saving in labor and oil costs he has made!

Why don't you try this modern Turbine Oil that is *guaranteed* to last as long as your turbine? Ask any Standard Oil (Indiana) lubricating representative about this guarantee.



STANDARD OIL COMPANY

STANDARD OIL COMPANY
WILL LAY AS LOW AS YOUR TUBE
 We guarantee that Nampang Tubing Oil, Medium or Heavy, will lay as low as your oil in put into use, and we have Nampang Tubing Oil, Medium or Heavy only, in stock for replacement, and the guarantee of oil from the beginning to last barrel. 1907

THIS GUARANTEE HAS NO TIME LIMIT
 It is of no time, when the oil is appearing under the above conditions, the customer may return the oil at any time within 60 days when determined by A. S. T. M. Standard No. 500 (7. T. we will recheck) satisfactory. We extend of course.

STANDARD OIL COMPANY (INCORPORATED)
Wm. H. Brown



STANDARD OIL COMPANY
SERVICE

September 9, 1957

STANDARD OIL COMPANY (Indiana)

William H. Brown
 1800 1/2



STANDARD OIL COMPANY

(INDIANA)

LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATING

OPERATING IDEAS from PRODUCTION, ELECTRICAL and MECHANICAL MEN

TABLE IV—THICKNESS SPECIFICATIONS FOR FLAT LEATHER BELTING APPROVED AND ADOPTED BY AMERICAN LEATHER BELTING ASSOCIATION

Medium, Single Ply, 11/64" Average	<p>"All thicknesses in this table are average thickness in inches, and should be determined by measuring twenty coils and dividing this total by the number of coils measured. In rolls of belting containing less than 20 coils, the average thickness should be determined by measuring all the coils in the roll. Allowable tolerances for all thicknesses plus or minus 1/64 in., from above averages."</p> <p>Uniformity: No point in single belting shall be more than 3/64 in. thicker or more than 2/64 in. thinner than the average thickness. With doubles, the tolerances shall be 2/64 in. thicker or thinner than the average.</p>
Heavy, Single Ply, 13/64" Average	
Light, Double Ply, 18/64" Average	
Medium, Double Ply, 20/64" Average	
Heavy, Double Ply, 23/64" Average	
*Medium, Triple Ply, 30/64" Average	
*Heavy, Triple Ply, 34/64" Average	

*Triple Ply: These are averages for general usage. Most triple-ply belts usually are constructed for particular drive conditions. Tolerances for single and double-ply belts do not apply. Consult a leather-belt manufacturer for specific information concerning thickness and construction of 3-ply belts.

vided by the values given in Tables I, II and III, as follows:

Equipment—Compressor, started automatically against pressure; equipped with 30-in. diameter pulley with 6½-in. face.

Motor—10-hp., 1,750-r.p.m., linestart induction unit; equipped with fiber pulley, 6-in. diameter, 6¼-in. face.

Conditions—Tight side of belt below; pulleys 6 ft. center to center; center line approximately horizontal; normal atmospheric conditions.

$$\text{Belt speed} = \frac{6 \times 3.14 \times 1,750}{12} = 2,750 \text{ f.p.m.}$$

From Table I—Light double belt is suitable for 6-in. diameter pulley and will transmit 6.7 hp. per inch of width at 2,750 f.p.m.

From Table II—Factor for center distance and small pulley diameter is 0.65.

From Table III—Atmospheric-condition factor is 1.0.

Angle of center line factor is 1.0.

Pulley-material factor is 1.2.

Service factor is 0.8.

Peak-load factor is 0.6.

$$\text{Consequently } \frac{10}{6.7 \times 0.65 \times 1.0 \times 1.0 \times 1.2 \times 0.8 \times 0.6} = 3.99 \text{ in.}$$

Therefore, use 4-in. light double belt.

Determination of belt capacity is shown in the following example, in which the object is to find if an 8-in. heavy double belt is suitable:

Equipment—Fan, 600 r.p.m., requiring 35 hp. at this speed; 16-in. diameter cast-iron pulley with 12-in. face.

Drive—Line shaft, 200 r.p.m., 48-in. diameter cast-iron pulley with 12-in. face.

Conditions—Tight side of belt above; 16-ft. centers; drive nearly vertical; operating eight hours per day exhausting from wood-working shop; dusty conditions.

95 tons per hour from railroad car to 18-ft. stockpile



$$\text{Belt speed} = \frac{48 \times 3.14 \times 200}{12} = 2,500 \text{ f.p.m.}$$

From Table I—Heavy double belt is suitable for 16-in. diameter pulley and will transmit 8.55 hp. per inch of width at 2,500 f.p.m.

From Table II—Factor for center distance and small-pulley diameter is 0.80.

From Table III—Atmospheric-condition factor is 0.7.

Angle of center line factor is 0.8.

Pulley-material factor is 1.0.

Service factor is 1.0.

Peak-load factor is 1.0.

$$\text{Consequently, } 8 \times 8.55 \times 0.80 \times 0.7 \times 0.8 \times 1.0 \times 1.0 \times 1.0 = 30.6 \text{ hp.}$$

Therefore the belt in question is not suitable for a 35-hp. load, although it can be used if any of the following changes are made: (1) installation of fiber pulley on fan; (2) reduction of drive angle from 60 deg. to horizontal; (3) protection of drive from dust; or (4) increasing pulley diameters to 60 and 20 in. If changing the drive is impracticable, use a 10-in. heavy double belt.

Powellton Coal Is Stocked By Conveyor and Stacker

Portable conveyors for transportation from railroad car to stockpile and reclaiming by a 2½-yd. crawler-mounted steam shovel which loads into the same conveyors are the coal-handling methods used by the Koppers Coal Co. at its storage at Elkridge, W. Va. Here, on a graded flat of the valley floor beside the railroad, 90,000 to 100,000 tons is stored and reclaimed annually.

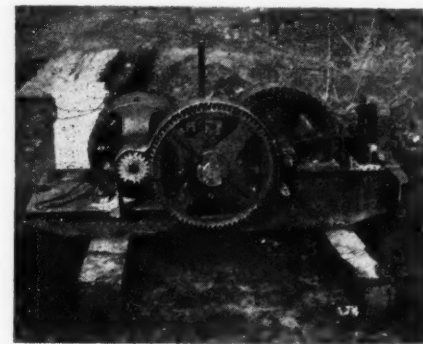
In the illustration, which shows a typical stocking layout, the units in use are:

a feeder in a shallow pit under the railroad car, three 45-ft. belt conveyors and one 60-ft. stacking, or elevating, conveyor, also of the belt type. Similar items of equipment on hand but not in use at the time were: one 45-ft. conveyor, one 60-ft. stacker and one feeder.

Slack is the size principally stocked and comes from the Powellton seam, which is excellent for byproduct purposes. Pile depth is 18 to 20 ft., laid down in one layer. Dumping and piling the contents of eleven 70-ton railroad cars in 8 hours is a typical accomplishment. Reclaiming is done at the rate of three 50-ton cars per hour or two 70-ton cars per hour.

Split Gears From Locomotives Used in Making Room Hoists

Discontinuing the use of split gears in its mine locomotives, the Carrs Fork Coal Co., Allock, Ky., employed them in the construction of room hoists for its mines. The drum, which is keyed to the forward shaft (showing a gear in the illustration), is made of two old machine-truck wheels with a flange welded on each side. The clutch is a sliding pinion on the counter-



Split gears removed from mine locomotives make this room hoist.

shaft. The lever (sticking up) engages or disengages the clutch. The 10-in. channels making up the framework of the hoist are old ones removed from the tippie. The white object behind the motor is a new \$30 controller, which, besides four new plain bearings, was the only new part purchased.

Pellet Powder Made Safer By New Priming Method

A new method of priming pellet powder with an electric squib, stated to be much safer and more dependable than the method in general use, has been devised by E. I. du Pont de Nemours & Co., Wilmington, Del. The method suggested is to draw the squib and wire all the way through the cartridge and about 10 in. beyond. The squib then is brought around the outside, separating the wires so that one is on each side of the cartridge, and is re-inserted in the front end. Then the



EDITOR

"FOLLOW THAT BATTERY!"

cracked the editor...and here are the pictures he got . . .

Battery Power Runs Underground Railway



IN MINES, Gould Batteries furnish power for sturdy electric locomotives. Hundreds of coal operators have chosen Goulds because they run longer between charges, have plenty of reserve power for tough hauls.

Battery Air Conditions Streamliners



RAILROADS—fifty-five of them—depend on Goulds. Passengers ride in comfort because Gould Batteries faithfully supply current for air conditioning and lighting.

CURRENT FOR MILLIONS OF PHONE CALLS



TELEPHONE COMPANIES count on Gould Batteries for smooth uninterrupted service. In this exacting field, Gould meets strict requirements to the letter—another big industry in which Gould Batteries help cut costs.

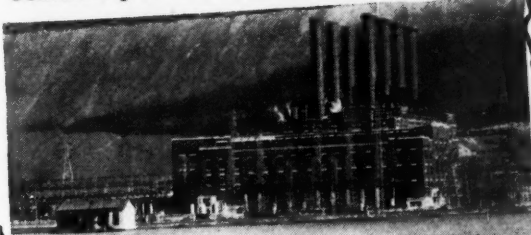
Lifts and Carries Awkward Load



INDUSTRY prefers trucks powered with Gould Batteries, because labor costs go down with Goulds on the job... production goes up, quickly and at minimum expense.

"Now I See Why Gould Has Been Picked by Engineers for 40 Years!"

Stands By to Furnish Emergency Power



UTILITIES—seventy major systems—employ Goulds to operate circuit breakers, relays, indicators and to supply current for emergency lighting. For the hard jobs, engineers in every industry pick Goulds!



GOULD PLANTE: Guaranteed 14 years in floating service. Maximum life with highest sustained capacity under all operating conditions made possible by exclusive one-piece pure lead spun plate process.



GOULD KATHANODE: Guaranteed from 4 to 12 years. Spun Glass construction provides long life, light weight and high capacity at low operating cost. For all motive power and railroad applications.

GOULD DREADNAUGHT Guaranteed from 2 to 8 years. Maximum capacity and long life when pasted plate construction for low initial cost is of primary importance.



NOTE: KATHANODE and DREADNAUGHT batteries are available in either Glass Jar or Hard Rubber construction.

FREE illustrated manuals describing any of these exclusive Gould constructions are yours upon request. Write: Gould Storage Battery Corporation, Depew, N. Y.

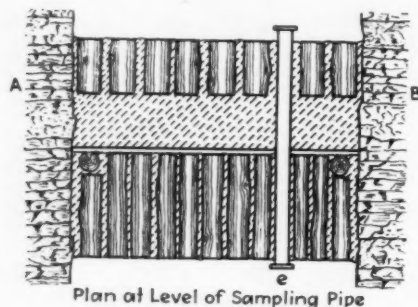
GOULD

wires are pulled tight. Separating the wires helps prevent short circuits.

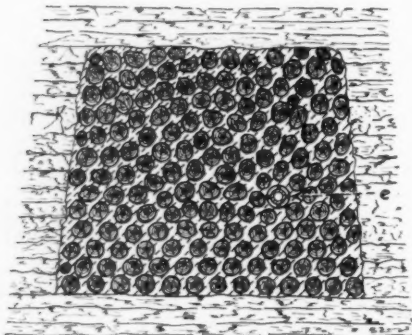
The method now commonly used in coal mines, according to the company, is to insert the squib in the end of the cartridge and make a half hitch with the wires around the cartridge. The new method anchors the wires more securely and the squib is much less likely to be dislodged.

Timber and Clay Employed In Ruhr Mines Stoppings

For sealing of mine fires and also abandoned working sections, a number of mines in the Ruhr field of Germany have used composite timber and clay stoppings for several years, according to P. Cabolet, in *Glückauf*. Rapidity of construction is one of the advantages claimed for this type of stopping, the form of which can be varied in accordance with the urgencies of the situation. A common single stopping is made by first laying down a bed of moist clay, following this by layers of pit props cut in 2-ft. lengths, packing each layer in



Plan at Level of Sampling Pipe



Section A-B

Plan and elevation of double clay-and-timber stopping.

moist rammed clay. A modification of this form of stopping recently was adopted at the Hanover Colliery, Bochum, in which the bottom and top layers of props were laid in clay, whereas the intervening layers were covered with clay for a distance of only about 4 in. at each end. The intervening open space then was filled with dry ground argillaceous slate, which was poured in place to give a reportedly firm filling.

A double timber-and-clay stopping is shown in the accompanying illustration. First, a single bar-and-clay structure is put up, against which a wall of rammed

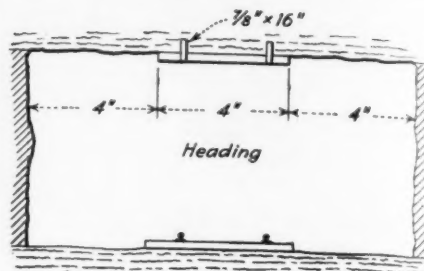
clay is built against the lagging, as shown. A pipe is placed for securing samples of the atmosphere back of the stopping.

The natural moisture in the clay, says the author, keeps the latter plastic and resilient. Usually, this moisture is not lost, as the mine air normally is high in humidity and if the stopping is placed against a fire area at least one side is exposed to the moist products of combustion. Construction of the stopping is more rapid with thick bars, and it is suggested that they be kept in storage holes at strategic points. The composite stoppings, the author also declares, are unaffected by moisture and combustion products, and any pressure applied to the bars merely forces them more tightly into the clay, which in turn is forced into the sides and roof, insuring a gas-tight seal.

Hanging Crossbar to Support Roof of Heading

Often the roof is weak only for a few inches above the top of a heading. Above it is a strong stratum to which the lower roof safely can be hung. Its strength may be dependent on protection from the air, and that protection will be afforded if the lower layer of roof is kept intact. This could be arranged by the use of a timber set, but such a set would have legs which might be displaced by a runaway trip and would interfere with ventilation and operation.

A templet of shiplap, according to Wesley S. Harris, president, Bicknell Coal Co., Bicknell, Ind., speaking at the American Mining Congress, is laid on the roof and two holes drilled therein 15 or 16 in. deep for the reception of a gimlet lag screw; the hole is $\frac{1}{4}$ in. less in diameter than the screw. A crossbar is similarly drilled, put in place and threaded with the screws, which, with the aid of long spanner, are forced into the roof. The



This crossbar hangs from the roof it supports.

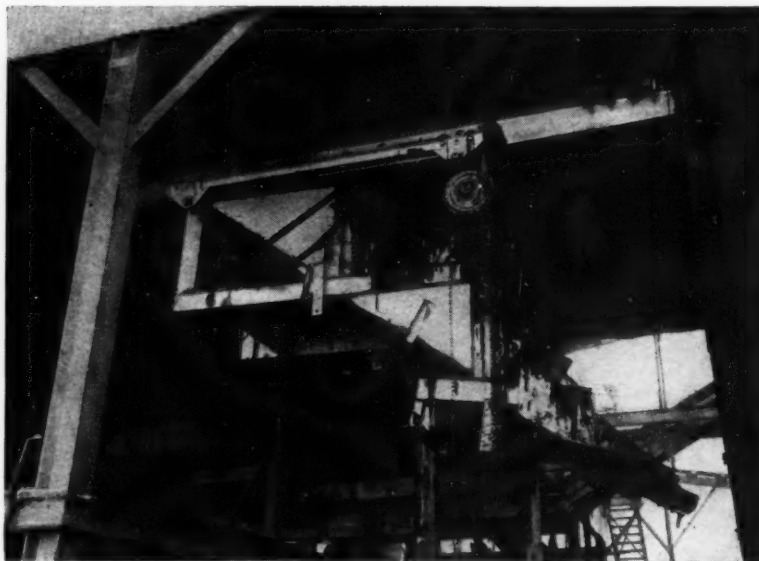
timber is only about 4 ft. long, though the heading width is 12 ft. Thus far, this method of support has been found effective.

Lump Lowering Conveyor Mounted on Wheels

To feed to the lump box-car loader at the King preparation plant of the United States Fuel Co., a lowering conveyor has been developed which can be moved back and forth on trolley wheels to adjust the spout position. The unit is held in a frame as shown in the accompanying illustration, and this frame is equipped with wheels. The tracks for the wheels are the flanges of channels alongside the mixing conveyor which brings the coal to the lowering conveyor. The lowering unit is moved back and forth to take the spout in and out of the box-car door by means of a 1-hp. motor.

Lumps are prevented from rolling down the spout by means of a retarding conveyor driven by a 5-hp. motor through a roller chain. The conveyor is of the double-chain type, with the bottom strand just clearing the bottom of the spout. Conveyor flights are made of old pieces of belting. Pinion size in the drive, of course, is adjusted to give the lowering conveyor sufficient speed to prevent choking.

In this view of the movable lowering unit at King mine, the lowering conveyor can be seen above the top of the downspout which feeds the box-car loader.



WORD FROM THE FIELD



House Slashes Bond Issue For TVA Power Deal

A slash of \$38,500,000 in the bill authorizing a \$100,000,000 bond issue for purchase of Tennessee Electric Power Co. properties by the Tennessee Valley Authority made on June 10 by an insurgent House Military Affairs subcommittee was adopted by the House on June 13. It also wrote in legislative restrictions relieving the Federal Government of obligation for the bonds and limiting the operations of TVA to the Tennessee River watershed and the area which would be served by the properties to be purchased, besides requiring that its fiscal policies be submitted to the General Accounting Office.

The bill, already approved by the Senate was assailed on June 2 before the House Military Affairs Committee by John D. Battle, executive secretary of the National Coal Association. In voicing the opposition of the bituminous-coal industry to the measure, Mr. Battle charged that, in the guise of giving Congressional sanction to the "deal," it would in reality effectuate a basic and far-reaching change in TVA's charter and confer upon it the right to purchase private electric plants without restrictions as to location, character or price.

Objects to "Blank Check"

"If it be agreed that the consummation of the present deal is desirable and ought to be sanctioned by Congress, and the entire case for the present bill is rested upon that contention," said the witness, "we submit that the simple way to accomplish it is by a simple Congressional resolution applicable to this particular transaction and nothing else. If at some future time there be a proposed deal by TVA to acquire some other electric power facilities from the private companies in the TVA area, we submit that Congress ought to pass on it before it is consummated, instead of giving TVA now a blank check for \$100,000,000 to buy whatever and wherever it pleases.

Mr. Battle pointed out that TVA's share in the total \$78,000,000 proposed to be paid by the Tennessee Electric Co. is figured at less than \$50,000,000, hence the \$100,000,000 bond validation carried in the proposed bill left TVA with a large fund for future undisclosed purchases.

"At least three steam-generating plants (Hales Bar, Nashville, Tenn., and Parksville, Tenn.) heretofore owned and operated by the private companies are included in this deal," the witness added, "and will be relegated to the standby status, and in consequence the bituminous industry stands to lose a quarter of a million

tons annually at a minimum through their shutdown. The loss of these outlets for coal and the resulting closing of mines and the permanent large-scale elimination of jobs in the production and transport of coal is unfortunate—and indeed disastrous, under any circumstances. It is doubly hard to bear when, as is the case here, it comes about through government action with the aid of subsidies out of the Federal Treasury and when in reality coal offers, in our opinion, a more economical medium today for the generation of additional increments of electric power in the Tennessee Valley than the TVA substitute, if the cost of the latter were to be computed at its true total."

Herbert S. Salmon, president, Alabama Coal Trade Extension Association, told the Committee that a million tons of Alabama coal would be displaced if Congress approved the TVA bond issue. About 20,000 persons directly dependent on the coal industry would be deprived of a livelihood, he added.

R. E. Howe, president, Appalachian Coals, Inc., and Roy Carson, appearing as spokesman for Southern associations, including Big Sandy, Harlan, Hazard and Virginia Coal Operators associations and the West Kentucky Coal Bureau, supplemented the testimony of Mr. Battle in opposing expansion of the TVA hydro-power program.

Coming Meetings

- Southern Wyoming Coal Operators' Association: annual meeting, July 11, Cheyenne, Wyo.

- American Coal Distributors' Association: annual meeting, Sept. 21-23, French Lick Springs, Ind.

- Joint meeting of Coal Division of American Institute of Mining and Metallurgical Engineers and Fuels Division of American Society of Mechanical Engineers: Oct. 5-7, Columbus, Ohio.

- Lehigh Valley Section of American Institute of Electrical Engineers: Oct. 11-13, Hotel Casey, Scranton, Pa.

- National Safety Council: 28th safety congress, Oct. 16-20, Atlantic City, N. J.

- National Coal Association: Seventeenth convention, Oct. 23-25, Roosevelt Hotel, New York City.

Seeks Federal Aid to Further Use of Pennsylvania Coal

Scientific research and investigation to develop more extensive uses of anthracite and bituminous coal and their byproducts are provided for in a bill introduced in the House of Representatives at Washington on May 25 by Representative James E. Van Zandt (R., Pa.). Facilities and the faculty of Pennsylvania's School of Mineral Industries and the experiment station of Pennsylvania State College would be employed in making the proposed studies. Expenses of the work would be shared equally by the Federal Government and the Commonwealth of Pennsylvania.

The measure calls for Federal appropriations of \$150,000 for the fiscal year 1941, \$50,000 for 1942, and \$100,000 each for the next three years. The Commonwealth of Pennsylvania would be required to match these contribution before any of the funds could be expended.

Representative Van Zandt said he already had taken steps to have a bill offered in the Pennsylvania Legislature, which must take action to comply with the terms of his measure. He said he would confer with Governor James of Pennsylvania in an effort to expedite action.

New Preparation Facilities

BEAVER MEADOW COAL CO., Beaver Meadow breaker, Beaver Meadow, Pa.: Contract closed with Finch Manufacturing Co. for one 3-ft. Menzies cone separator with feed capacity of 12 tons per hour for cleaning rice coal; to be completed July 1.

DIAL ROCK COAL CO., Exeter, Pa.: Contract closed with Wilmot Engineering Co. for one 36-in. Wilmot hydroseparator for preparing rice coal at rate of 20 tons per hour; also additional facilities; now in operation.

GREEN RIDGE COAL CO., Scranton, Pa.: Contract closed with Wilmot Engineering Co. for one hydroseparator to prepare 20-25 tons of No. 1 buckwheat per hour; also other facilities; to be in operation about July 1.

MOREA-NEW BOSTON BREAKER CORPORATION, Morea breaker, Morea, Pa.: Contract closed with Finch Manufacturing Co. for new cleaning plant containing four 8-ft. Menzies cone separators with feed capacity of 280 tons per hour for cleaning egg to No. 4 buckwheat sizes; to be completed Aug. 1.

PYRAMID COAL CORPORATION, Pinckneyville, Ill.: Contract closed with McNally-

Pittsburg Mfg. Corporation for complete tipple and cleaning plant to replace old structure; provision for all coal to be broken to minus 6 in. in McNally-Pittsburg adjustable double-roll breaker; entire tonnage to be cleaned in three McNally-Norton automatic washers and classified into seven sizes; loading on seven tracks; capacity of plant, 800 tons per hour of mine-run; to be completed in October.

REED-RUDOLPH COAL Co., Logansport, Pa.: Contract closed with Deister Machine Co. for one latest type Deister Plat-O coal-washing table to treat 0x1-in. coal at an estimated feed capacity of 15 tons per hour; this is a new plant at an old operation.

STITH COAL Co., America, Ala.: Contract closed with Deister Machine Co. for one latest type Deister Plat-O coal-washing table for treating 0x1-in. coal at an estimated capacity of 15 tons per hour; additional equipment in existing tipple.

Federal Mine Inspection Bill Rouses Stern Opposition

Violent opposition to Senator Neely's bill (S. 2430) providing for government inspection of coal mines (*Coal Age*, June, p. 85) has developed in the National Coal Association. The association contends that the bill—also presented in the House by Representative Keller of Illinois—would virtually provide Federal regulation of the underground workings of coal mines. Furthermore, it is charged, it is the first step toward elimination of State mining departments, a drive to destroy safety work because of conflict of jurisdiction, means another government bureau probably employing thousands of people, with greater expense to the industry; in fact a measure utterly unnecessary and superfluous.

Anthracite Control Defeated

The Kane anthracite quota bill (*Coal Age*, June, p. 85) was defeated in the Pennsylvania State Senate on May 28. Though it passed the House, 111 to 81, the vote in the Senate was a tie, 24 to 24; 26 votes were required for passage. The measure provided for State regulation of output under a three-man commission to be appointed by Governor James.

Asks Court to Enforce Edict

The National Labor Relations Board petitioned the Sixth U. S. Circuit Court of Appeals at Cincinnati, Ohio, on May 29 to enforce a cease and desist order issued last December against the West Kentucky Coal Co., Madisonville Ky. The board had ordered the company to cease alleged encouragement of membership in the Employees' Mutual Benefit Association and discouraging membership in the United Mine Workers by discharges, discrimination, espionage and threats to close the mine. The board also directed the company to reemploy, with back pay, five men discharged for alleged union activity and to return to members of the association dues and assessments collected.

Trackless Mining and Handling of Men Discussed by Indiana Institute

PUTTING business before pleasure, Indiana Coal Mining Institute members first heard papers on trackless transportation, an automatic elevator for handling men, and foremanship training, topped off with a motion picture on the manufacture of steel presented by Thomas L. McCoy, Carnegie-Illinois Steel Corporation, at the 1939 summer meeting at the Vendome Hotel, Evansville, Ind., May 27. H. G. Conrad, general manager, Knox Consolidated Coal Corporation, and president of the institute, wielded the gavel. With serious matters out of the way, golf, visiting and other forms of relaxation filled the interval until the banquet, at which W. P. Allyn, Indiana State Teachers' College, was toastmaster, and Jesse E. Wade, attorney, Mount Vernon, Ind., the speaker of the evening.

Reporting on a year's operation with the Fletcher system of trackless transportation, which displaced cars and rails in rooms at the Wick mine of the Ingle Coal Co., Oakland City, Ind. (*Coal Age*, October, 1938, p. 29), W. D. Ingle, Jr., superintendent, pointed out that coal is loaded mechanically from the Indiana No. 5 vein, averaging 6 ft. in thickness. The top ranges from excellent to very bad. Some sections are very dry but on the whole the mine is damp and many rooms actually are muddy where no bottom coal has been left for the tractors to run on.

Under the old system, rooms were driven 28 ft. wide on 40-ft. centers. Two rooms were picked up on each side of a center room, and maximum production from a 7-BU loader with 5-ton Sanford-Day and A.C.F. drop-bottom cars was 300 tons in a 7-hour shift. Loader crews were made up as follows: one loader operator, one helper, two cutters, two drillers, one motorman, one triprider, two timbermen, one boss, one electrician, and two track-

layers, or a total of fourteen. With the rubber-tired tractors, the crew for one loader consists of: two loader operators, two cutters, two drillers, two tractor drivers, one timberman, one boss and one-half an electrician's time, or a total of 10½.

Under the old system, the Joys, at best, "could not hope to exceed 350 tons in seven hours," whereas in March, 1939, when the tractors were operating over their longest haul of close to 2,500 ft. per round trip, and with mud, water and bad top to contend with, the average Joy output was 365 tons. "Under favorable conditions and with a normal haul we expect an average of 500 tons or better per loader, making close to 50 tons per man on the crew."

The major advantage of the tractor system, Mr. Ingle stated, was a sharp reduction in changing time, permitting the loading machines actually to operate close to two hours more in seven. Tractors are able to follow the loader very closely, and thus no time is lost in waiting for the haulage unit to come back after a shift in position; also the loader need not do so much shifting to get into position. With track eliminated, the loader does not have to climb over rails and therefore can shift in high gear without the chance of breaking a caterpillar chain or drive shaft. Furthermore, the coal normally left in the track is loaded, and a consequent gain in screenings tonnage. And repairs on loading machines took "a sudden drop."

Joy caterpillar trucks were purchased for moving the Jeffrey 35-BB shortwalls used. Ability to go from room to room through crosscuts increased cutting time and reduced congestion. The greater ease of handling the cutters on caterpillars greatly increased sumping speed and the number of rooms cut was boosted nearly



The Men Behind the Evansville Meeting

Left to right—A. E. Schoettler; James H. Fletcher; W. A. Vinson; Thomas Schull; H. G. Conrad, institute president; Harvey Cartwright, institute secretary; D. W. Jones; and W. D. Ingle, Jr.

"Since this Gulf Engineer
recommended
GULF HARMONY OIL
our motors, generators and hoist
bearings run better"

... SAYS THIS CHIEF ENGINEER



Actual photograph of a Gulf lubrication engineer (at the right) consulting with the chief engineer of the mine regarding the use of Gulf Harmony Oil for hoist bearings and Gulf Lubcote—a special heavy-bodied lubricant with remarkable adhesive properties—for wire rope lubrication.

This modern oil house has contributed much to efficient lubrication in this mine. Each motor man and cutting-machine operator has an individual oil can which is properly numbered and placed in the cabinet for which he has a key. Thus, the use of the proper Gulf brands for each requirement is assured.



"GULF Harmony Oil is doing a better job for us," says this chief engineer. "Since we adopted this Gulf engineer's recommendations, we have had no trouble with oil gumming."

You can get valuable service from the Gulf engineer who calls at your mine. He is ready to give you the benefit of his broad experience, and will assist your operating men in setting up proper lubrication procedure for all your equipment. And remember this: *his one aim is to help you increase efficiency and improve production.* Lower ultimate costs for maintenance and lower over-all operating costs usually accompany this careful attention to lubrication.

Gulf quality lubricants are readily available to you through more than 1100 Gulf warehouses located at principal distributing points from Maine to Texas. The Gulf line includes more than 400 oils and greases. Ask the Gulf engineer to recommend the brands best suited to your equipment.

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one-third. With the tractors operating on storage batteries, charging is done at night, with consequent reduction in demand peaks. "No further trolley was strung and trouble with broken rail bonds was eliminated. Track upkeep was limited to the main line and is practically negligible. Where bottoms are soft, some crushed rock can be spread to keep the tractors from miring. Battery upkeep is taken care of by one man on the night maintenance crew." Reserve batteries are available in case those in use run down before the shift ends, which seldom is the case. Long hauls through mud and water generally give the most trouble in tractor operation.

Each tractor pulls a 5-ton Sanford-Day drop-bottom trailer, and the coal is dumped into a hopper sunk in a pit, from which it is fed out onto a belt conveyor running up to a station where the regular 5-ton drop-bottom mine cars are loaded in trips of ten each. Two such trips more than suffice for the 800 to 900 tons of coal coming from the tractor run. The round-trip haul from the loading station to the bottom is about one mile and requires about 10 minutes.

Bad top is little more trouble for the tractors than for mine cars, as the drivers become quite adept and can go into places where the clearance on either side of the trailers (a bit over 6 ft. wide and 12 ft. long) is little more than a foot. "The maintenance on the entire outfit is far less than under the old system and, with the expectation of greater efficiency, we are very well satisfied with the installation and have seen nothing to surpass it for our conditions. When a section is finished, the only material to be removed is the power line for the cutting machines, loaders, etc. No track equipment is lost.

50 Tons Per Hour Loaded

"In March, 1939, we worked twenty days and the two loading machines filled 3,909 mine cars, making the total output 14,489 tons, or 709.25 tons and 191.05 cars per day. This is 50 tons per hour per loader, or about 5 tons per hour per man on the crew. At that time, however, the haul was the longest and the roof and bottom conditions were the worst. Despite these unfavorable conditions, the machine output on some days was over 500 tons. Thus we feel that, given fair conditions, close to 50 tons can be expected as an average now that the tractor operators have become expert in handling their machines.

"When extremely long hauls or muddy conditions were encountered another tractor was placed in service to keep the loading machines working at capacity. Approximately 110,000 tons was removed from the run before another pit was dug for a new transfer station. The cost of installing the transfer station would be much less in a dry mine than where mud and water cause the loading machines and equipment to mire down. Two shifts drilling and shooting and two loading can be counted upon as the time necessary to dig a pit through sandstone, mud, water and boulders. The cost of excavation, including powder, power, labor and equipment, is in the neighborhood of \$500. Installation of the equipment requires about three shifts, depending pretty much on how far it has to be moved."

Mr. Ingle's oral presentation was fol-

lowed by a motion picture by the Electric Storage Battery Co., whereupon the discussion was opened by Thomas Schull, general superintendent, Blue Bird Coal Co., Carrier Mills, Ill., who pointed out that the first three tractor-trailer units for underground use were built in the Blue Bird shops. In producing 250,000 tons with this equipment in three years, only one tire has had to be replaced. Nine tractor-trailer units now are in service behind three loading units, and the coal is brought out to the railroad car by 2,100 ft. of belt in four sections, each section driven by a 15-hp. motor. Tractors are powered by 300-amp.-hr. batteries and the trailers hold 3 tons. The coal dips about 4 per cent and quite a bit of water is encountered at times. Mining is done in accordance with the Fletcher system, in which a number of shallow room necks are cut together to make a long face, which is slabbled as much as the roof will permit, after which new necks are driven to make a new face. Length of the slab-



Wesley Harris, president, Bicknell Coal Co., and H. A. Cross, general superintendent, Walter Bledsoe & Co., take their ease, supervised by Coal Age Editor Ivan A. Given

bing cuts is around 530 ft. Cutting machines are moved around on a rubber-tired truck made from an old track-type truck.

With 5-ton trailers, said Mr. Ingle, 450-amp.-hr. batteries are used at the Wick mine and, in spite of heavy grades in places, last the full seven hours as a general rule. Minimum width of room in which the tractor-trailer units can operate has been the subject of study, and where the top was bad some rooms have been cut down to 15 ft. without materially affecting operations. Timbers are not an obstacle as long as they are 15 ft. apart, a conclusion in which Mr. Schull concurred.

Tractor-trailer units of the Fletcher type are used in mining the No. 9 seam, averaging 54 in. at one mine of the Hart Coal Corporation, in western Kentucky, said W. A. Vinson, general superintendent. Operation with this type of equipment started in February, 1937 (*Coal Age*, January, 1938, p. 47), but crews run a little higher than the 10½ men at Wick. Three trailer units are used after a Joy 8-BU loader, as that number has been found the most economical. Mining to date has been largely in fingers of coal, but the company has tried to hold the haul to 2,000 to 2,500 ft. Substantially the same mining plan as at Blue Bird is employed, and face length has run as high as 500 to 650 ft. With three tractor-trailer units operating, as high as 750 tons has been loaded in seven hours. The pres-

ent equipment eventually will be installed in a new mine now being built.

Flexibility is perhaps the major advantage of the transportation system under discussion, declared James H. Fletcher, consulting engineer, Chicago, the father of the idea. One item to be watched is to have tires designed so that they will not cut into the floor. At present, the system is in operation in four mines, and in each case has been very successful from the standpoint of cost and adaptability to installation in an old mine to provide maximum efficiency in mechanical loading.

When the Kings Station mine of the Princeton Mining Co. was built, two shafts were sunk in accordance with usual practice, said D. W. Jones, superintendent, in discussing the use of an automatic elevator for handling men. The main shaft was designed to handle coal, men and supplies, while the air, or auxiliary, shaft was fitted with a stairway in the down-cast compartment. Consequently, when service in the main shaft was interrupted men had to enter and leave the mine the hard way: i.e., by using the stairs in the auxiliary shaft. This was one factor in a decision to put an automatic elevator in the auxiliary shaft, but the major one was ease in handling injured men. Under the old plan, it was necessary to carry an injured person up the stairs in case the main hoist was out of service or, lacking that, to send the doctor into the mine. Neither of these alternatives could be classed as satisfactory.

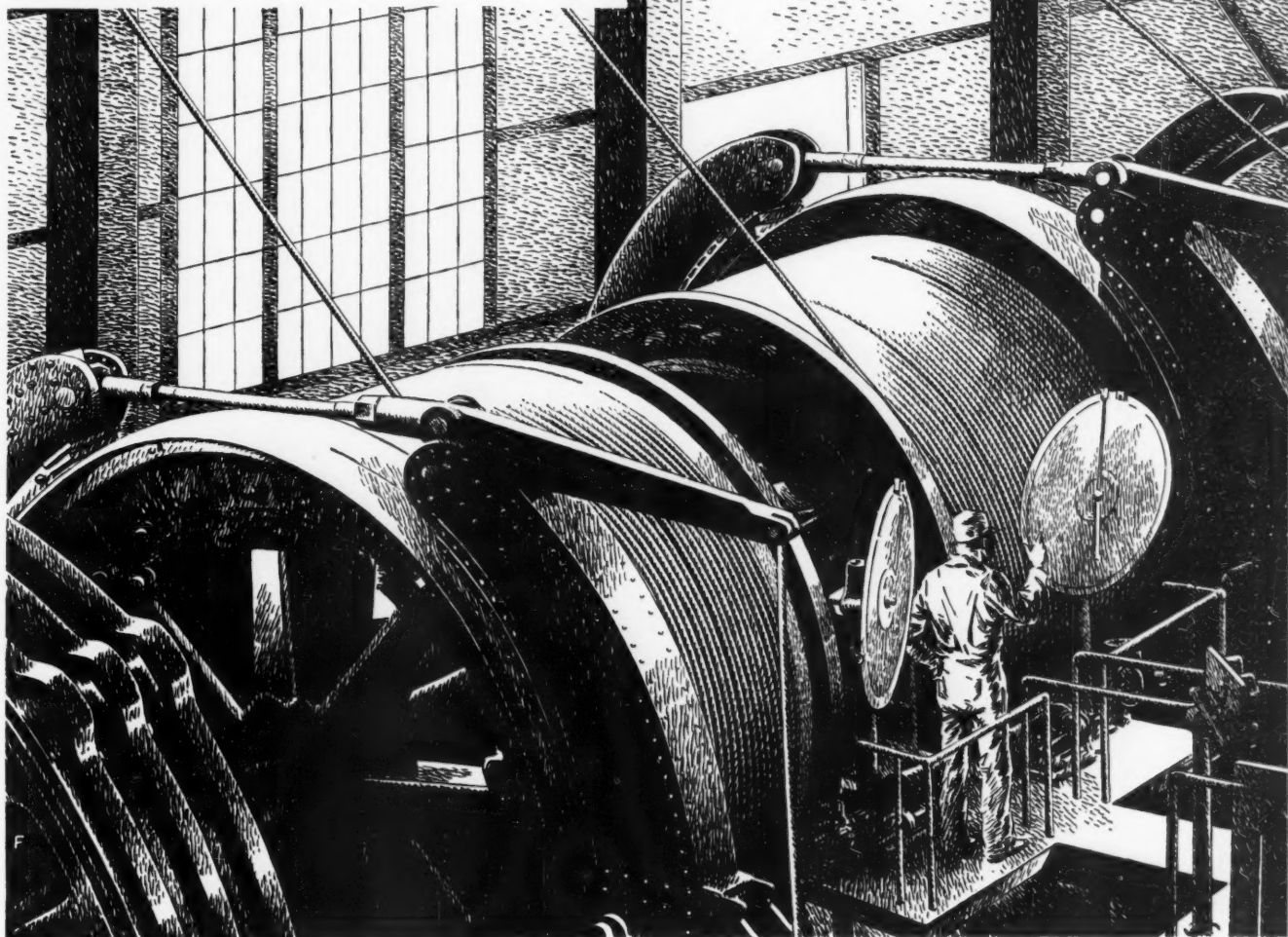
Automatic Elevator Best

In deciding on elevating equipment for use instead of the stairway, the automatic electrical type was outstanding in its advantages. As it was to be used for the convenience of the men, it had to be available for service at any and all times without the assistance of an attendant. Again, "the principles of operation did not involve any experimental devices, as the controls are in general use for passenger and freight services in all types of buildings. So if they could be used with safety on the surface, there should not be anything hazardous or vague about traveling underground in an automatic type of elevator which did not have an attendant or operator." And electrical controls eliminate the human element usually present in hoisting.

In installing the automatic elevator, considerable study was devoted to guarding against every conceivable failure. "Simplicity and reliability of equipment were the first consideration. For this reason, no trailing electrical cables were attached to the elevator, for in time they would become worn and defective. Accordingly all controls for the operation of the elevator were placed at the top and bottom stations and the installations were made in a permanent and careful manner."

The hoist is a standard Thomas mine-type unit with a cylindrical drum 5 ft. in diameter. It was built to operate at 600 r.p.m., although at present it runs at 20 r.p.m. The original design provided for the use of a 300-hp. motor, but now a 100-hp. 870-r.p.m. unit loaded to about 75 hp. is used. Rope diameter is 1¼ in., and total length is 650 ft., although hoisting distance is 450 ft., requiring 70 seconds. Average rope speed is 386 f.p.m., or less than two-thirds that allowed by the Indiana mining laws. The motor is

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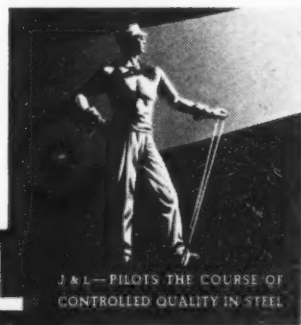
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controlled by a Westinghouse elevator-type switchboard with four points of acceleration. Contactors are interlocked to prevent them from closing in improper sequence, and the switchboard controls have all the approved protective equipment to guard against overload and low voltage. Wiring from the power house to hoist house, and from there to the shaft, all is inclosed in lead-covered and armored cable.

The hoist is equipped with a Lilly control and dial indicator having a flyball governor to prevent overspeeding the drum or overwinding the rope, in which case a trigger mechanism releases weights to set the hoist-drum brake. Limit switches operated by the elevator and counterweight offer additional electrical protection against overtravel. Reduction in motor speed is accomplished by a Westinghouse reducer connected by a flexible coupling to the drum gear. The driving motor is equipped with a Thrustor brake, which is normally closed and can be released only by the application of power. Thus, in case of power failure, the brake will close and hold the elevator stationary until the power comes back on, whereupon the regular starting sequence will go into effect. The dial indicator is equipped with contacts operating signal lights in the main hoist room. These lights show whether the elevator is at the top, bottom or between landings and permit the hoisting engineer to keep an eye on its operation.

Elevator Can Carry 33 Men

The elevator, built by Robert Holmes & Bros., is equipped with standard safety catches and has a maximum capacity of 33 men, although the limit so far has been set at fifteen. Gates at the top and bottom landings must be closed before the elevator can be started. The top gate is interlocked so that it cannot be opened when the elevator is away from the landing. Telephones are installed at the top and bottom of the shaft. When the elevator is away from the top landing, men can tell by observing the hoisting rope whether it is at the bottom or traveling up or down. A fog light has been installed for assisting in this determination and also to give men a good view of the shaft. At the bottom landing, indicating lights tell whether the elevator is at the top or traveling up or down.

Pushbutton stations at the top and bottom landings control the operation of the elevator. One button at each station raises the elevator, another lowers it, and a third brings it to a stop if it is in motion. Inching buttons are used for leveling the elevator with either the top or bottom landings. Signal lights are provided, which must be turned on before the elevator can be used. The elevator has a waterproof roof in addition to the steel bonnet, while the floor is made of open grating, inasmuch as the elevator compartment also is the mine upcast.

Pointing to the success of a training program for coal miners, inaugurated with the assistance of the institute and conducted by Kirk V. Cammack, A. E. Schoettler, assistant professor of trades and industry, Indiana State Teachers' College, presented a strong plea for the institution of a course of foremanship training. At present, said Professor Schoettler, aid to the foreman in performing his

Miners Lend \$50,000 To Open Colliery

Instead of "touching" their boss for money, 500 miners formerly employed by Weston Dodson & Co., Inc., at the Packer colliery, Wilkes-Barre, Pa., have agreed to lend the boss \$50,000. Each of the men will put up \$100 to provide working capital for reopening the mine. The men agreed to supply the money after the company put up about \$100,000 and the Girard Estate, owner of the property, \$325,000. The miners will pay \$5 every two weeks until each has lent \$100. Their money is to be returned, with interest, within two years. If the mine closes or if the miners leave their jobs, their money will be returned immediately.

duties is on a more or less haphazard basis, with the result that he does not get the assistance that is his just due.

Requesting the aid of the institute in establishing a foremanship training course, Professor Schoettler suggested the following topics that might be covered with profit: human relations, duties and responsibilities of a foreman, job analysis, personal attributes of a foreman, quality and not quantity in mine supervision, company policies, discipline, the foreman's responsibility for job training, paper work and reports, the "three C's" of maintenance and coal preparation.

Personal Notes

E. B. AGEE, general manager, Youngstown Mines Corporation, Dehue, W. Va., has been elected president of the newly formed Guyan Valley Mining Institute. Other officers named are: vice-presidents, W. W. BEDDOW, general superintendent and mining engineer, Logan County Coal Corporation; HARRY FREEMAN, general superintendent, Georges Creek Coal Co.; and ANDY F. WHITT, general superintendent, West Virginia Coal & Coke Corporation; secretary-treasurer, H. P. FARLEY, district mine inspector; recording secretary, J. W. COLLEY, secretary, Logan County Coal Operators' Association.

N. C. ANDERSON, general manager, Huerfano Coal Co., has been elected president of the Colorado & New Mexico Coal Operators' Association. The vice-president is W. J. THOMPSON, president, Colorado & Utah Coal Co.; secretary-treasurer and traffic manager, F. O. SANDSTROM.

NORMAN F. BECKER has been appointed mine foreman at No. 1 shaft, Truesdale colliery, of the Glen Alden Coal Co., Nanticoke, Pa.

F. E. BEDALE, heretofore assistant to the vice-president in charge of operating efficiency, Consolidation Coal Co., has been appointed assistant to the general manager of operations in charge of safety and special assignment work.

W. A. BELL has been made general superintendent of the mines of the Brookside-Pratt Mining Co., Birmingham, Ala. He was formerly superintendent of the company's eastern division.

C. E. BOCKUS, president, Clinchfield Coal Corporation, has been renamed on the Natural Resources Committee of the Chamber of Commerce of the United States.

D. D. DODGE has resigned as general superintendent of the coal mines of the Woodward Iron Co., Woodward, Ala.

JAMES P. DUFFY, assistant to the president, Anthracite Industries, Inc., has resigned, effective July 1, to become director of advertising and sales promotion for the Jacob Ruppert Brewing Co., New York City. Previous to joining Anthracite Industries, three years ago, he was advertising manager in charge of the "Blue Coal" campaigns for the Delaware, Lackawanna & Western Coal Co.

WILLIAM W. EVERETT has been named assistant superintendent at Truesdale colliery of the Glen Alden Coal Co., Nanticoke, Pa.

WILLIAM FINDLAY, JR., general superintendent, Simpson Creek Collieries Co., was elected president of the Northern West Virginia Coal Association on June 1; he succeeds Charles Dorrance, resigned. SAMUEL PURSGLOVE, vice-president, Purs-glove Coal Mining Co. and Pursglove Gas Coal Corporation, was named vice-president, and TRUMAN E. JOHNSON, vice-president, Hutchinson Coal Co., was reelected secretary-treasurer.

M. H. FORESTER, formerly preparation manager, Consolidation Coal Co., has been appointed manager of the West Virginia division of the company. He succeeds William J. Wolf, now general manager of operations.

J. D. FRANCIS, president, Island Creek Coal Co., received the degree of LL.D. at the 102d commencement of Marshall College, Huntington, W. Va.

R. S. GRAHAM, president, Kemmerer Gem Coal Co., and vice-president, Wise Coal & Coke Co., has been elected president of the Virginia Coal Operators' Association. Other officers named are: vice-president, J. D. ROGERS, vice-president, Stonega Coke & Coal Co.; secretary-treasurer, GEORGE H. ESSER; assistant secretary-treasurer, E. H. ROBINSON.

D. W. GREENE, for many years general superintendent of the Gillespie and Perry coal companies, O'Fallon, Ill., has been appointed master mechanic for the Superior Coal Co., Gillespie, Ill.

M. R. GROVER, lately New England manager, Anthracite Industries, Inc., has been named assistant to the president, in charge of field operations, advertising and sales promotion, vice James P. Duffy, resigned. R. M. SNOW, a member of the New York staff for the last three years, will be assistant to Mr. Grover, in charge of field activities, and E. H. WALKER, assistant in charge of advertising and exhibits. J. D. JILLSON has been transferred from Rochester, N. Y., to New York City as sales engineer, succeeding E. L. BULLER, who has resigned to accept a position with Electric Furnace-Man.

M. S. HALL, recently associated with the Anthracite Industries Laboratory as development engineer, has been engaged by the Klein Stove Co., Philadelphia, Pa., to head the engineering and promotion development work of its subsidiary, the



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Freed Heater & Mfg. Co. Prior to his connection with Anthracite Industries, Inc., Mr. Hall had been field engineer for Babcock & Wilcox Co. and design engineer for the May Oil Burner Co.

JOHN A. HAMILTON has been made superintendent at the Bliss colliery of the Glen Alden Coal Co., Nanticoke, Pa.

GEORGE R. HIGINBOTHAM has been named general manager's field representative, Consolidation Coal Co., Fairmont, W. Va., to cooperate with mine superintendents and division managers on operating problems.

RALPH H. HODGSON has been named mine foreman at No. 5 slope, Huber colliery, of the Glen Alden Coal Co., Ashley, Pa.

R. E. HOWE, president, Appalachian Coals, Inc., has been appointed to the Natural Resources Committee of the Chamber of Commerce of the United States.

W. H. HOWELL, purchasing agent, Victor-American Fuel Co., Denver, Colo., has retired from that post after 42 years' service with the company. He was 77 years old on May 30.

F. F. JORGENSEN, assistant general manager of operations, Consolidation Coal Co., Fairmont, W. Va., has resigned. Mr. Jorgensen's health has been below par during the last year.

D. J. JOSEPH has been appointed superintendent at the Wanamie colliery of the Glen Alden Coal Co., Wanamie, Pa., vice T. J. PHILLIPS, resigned.

R. K. KINGSLAND, hitherto electrical engineer, Consolidation Coal Co., has been made electrical and maintenance engineer, reporting to the chief engineer.

FRED L. KLIPPLE has been made mine foreman at Wanamie colliery of the Glen Alden Coal Co., Wanamie, Pa., vice Daniel Igo, deceased.

HARRY LAVIERS, vice-president, North-East Coal Co., was reelected president of the Big Sandy-Elkhorn Coal Operators' Association at its annual meeting on June 2 at Ashland, Ky. L. C. CAMPBELL, assistant to the vice-president, Koppers Coal Co., was renamed vice-president; H. H. KUHLLING Elkhorn Collieries Corporation, was made treasurer, and H. S. HOMAN was reelected secretary. Directors include T. W. ENGLISH, JAMES R. HURT, C. D. JACOBS, R. H. KELLY, W. F. MANDT, E. R. PRICE, W. F. PIOCH, B. F. REED, ALAN J. SMITH, VARNELL TATE, C. W. WATSON and W. J. WOLF.

JOHN R. LAWSON, vice-president in charge of operations and general superintendent, Rocky Mountain Fuel Co., Denver, Colo., has resigned in order to devote his time to experiments on a coal-mining machine. For many years he was president of District 15, United Mine Workers, joining the Rocky Mountain company in 1928 to direct its labor policy.

PAUL HOUSTON STEWART has been appointed electrical and maintenance inspector for all divisions of the Consolidation Coal Co.

Not Only Talk Safety But Make It Stick Theme of Mine Inspectors' Institute

HOW to implement mine examination, State and private, so that safety will be transformed from aspiration to accomplishment, was a feature of the addresses and discussions of the Thirtieth Annual Convention of the Mine Inspectors' Institute of America, held at the William Penn Hotel, Pittsburgh, Pa., June 5-7 inclusive.

To emphasize mine defects found by inspection, the West Virginia Department of Mines, beginning 1938, introduced a new form of inspection report, declared H. G. Houtz, mining engineer of that organization. After every mine has been

accidents was the gist of the article written by R. N. Hosler, superintendent, coal-mine section, Pennsylvania Compensation Rating and Inspection Bureau, and read by Thomas Allen, chief, Colorado Coal Inspection Department. Where, by reason of compliance with the schedule, the charge on a mine was reduced 49 per cent below the average of all mines, compensation payments fell 43 per cent. The lowest rate mines, as a group, have the lowest loss ratio, and the highest rate mines, on the whole, the highest loss ratio.

Rating inspectors are "not supposed to make any recommendations for the removal of hazards or dangerous conditions." They merely record what they find, but the operator, keen to reduce his insurance cost, recognizes the need for compliance with the schedule.

Merit Rating Adopted in 1927

In 1910, the Consolidation Coal Co. had a mine inspection system but the inspectors were responsible to a head entirely independent of the operating department. They had no written standards or standardized methods, asserted the article of F. E. Bedale, assistant to the vice-president of the company, which was read by H. A. Williamson. The operating department received a copy of the inspector's report and, therefore, could have corrected conditions, but, when it did not, there was no follow-up and, unless some accident verging on a catastrophe occurred, no criticism. In most cases, the money spent on inspection was a dead loss, discouraging inspectors. For these reasons, in 1927 a new department was organized and a system established similar to the merit rating of the State of Pennsylvania.

Standards were prepared, for without standards the inspector could not tell if the work was rightly or wrongly performed. All he could tell was whether it was done in the manner he preferred. Standards should be based on accident data, but these were few. In the new set-up of the department, it was required that inspectors be acquainted with every phase of mining, competent first-aid and mine-rescue instructors, grounded in the company's standards and rules, familiar with the operation of electric locomotives and mining machines, diplomats, teachers, fair and firm, with an impressive personality.

Accidents are divided into almost 400 classifications, and the standards are based on them; thus, rules can be justified by definite experience. At first, reports were made of the mines as a whole; now they are made of sections giving name of section foreman and thus fixing responsibility. Each section receives a rating, as 1, 2, 3 and 4, and the mine foreman is similarly rated for his care or lack of care over main haulage, air-courses, etc. The ratings are added and divided by the number of sections, plus one for the foreman's section, and thus the entire mine and the foreman are rated. Similarly the superintendent is rated by the sum of the inside ratings, plus the ratings of the outside foreman



Thomas Allen

subjected to an equal yardstick of inspection, every defect in condition and practice is marked by a red circle, and the fewness of these in the report of a mine indicates the progress that mine has made toward safety.

Ratings, other than those of the West Virginia Department of Mines, are made usually by applying weighted values to various defects or by awarding weighted credits for various improvements, but this inspection report makes no distinction between one violation and another. Nevertheless, for all practical purposes, the number of red circles serves as an effective rating.

Already, this tabulated report has reduced accidents, for during 1938 the State of West Virginia mined 391,260 tons per fatal accident—the best record the State has ever enjoyed—and the tonnage per fatality was 14 per cent higher than the previous five-year average. Also, 10,166 tons was mined per non-fatal accident—an increase of 27 per cent in the tonnage. Prior to 1938, mine fires were frequent but now they are almost eliminated. An average mine receives 37 red circles; statistics show that the fewer they are, the safer the mine.

That inspection and rating for insurance based on the report of the inspector—"merit rating"—has caused hazards in mines to be eliminated and has reduced

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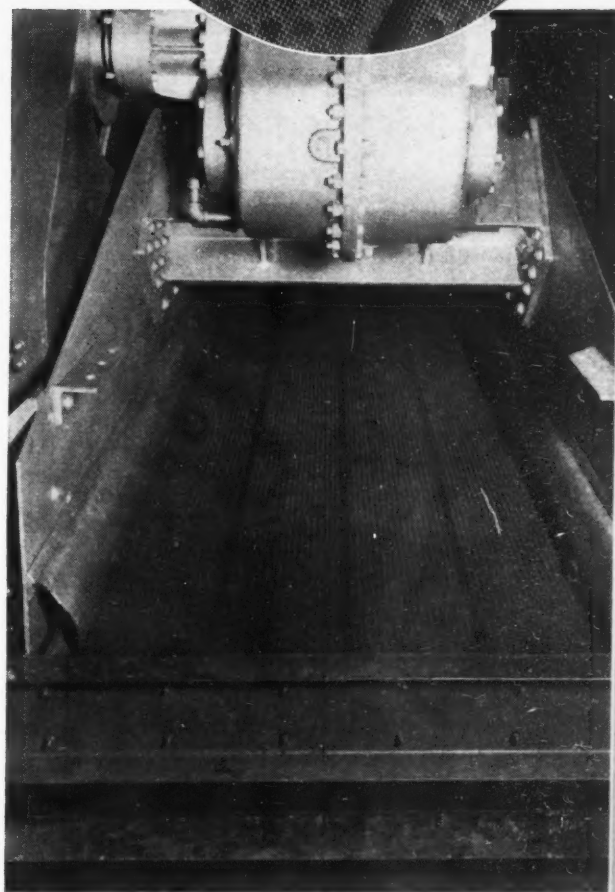
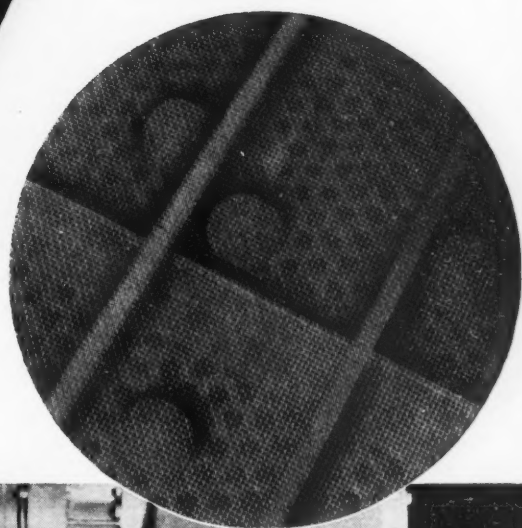
Where it was formerly necessary to employ extra labor to pound the screen cloth or remove the cloth for cleaning, you can now get complete control... with continuous operation... at lower operating costs!

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divided by the aggregate number of these ratings.

But this is not all; a record is kept for each foreman of the number of 3-day lost-time accidents per thousand man-hours of exposure, which is used with the other rating to establish his efficiency in promoting safety. There are also disciplinary standards, and an honor roll which is published monthly.

A campaign for lessening accidents from falls of roof and coal conducted in 1931 by the Department of Mines of Pennsylvania increased in 1932 by 200,000 tons the production per fatal accident from all causes, a figure never before reached and one that has been maintained except in 1936, recalled S. J. Phillips, mine inspector, Scranton, Pa. Compensation payments alone were reduced \$867,127. The total saving to the industry, operators and mine workers, was perhaps \$3,500,000.

Most companies in Illinois, declared James McSherry, director, Department of Mines and Minerals, require their men, when at work on machines, to stop at frequent intervals to sound the roof. Fewer accidents, he added, will occur in well-lighted mines.

Severity Rate Cut to 0.97

At two mines with horsebacks, kettle bottoms and rib rolls, the severity rate was cut from 15.38 in 1934 to 0.97 in 1938, said P. A. Grady, Carrs Fork Coal Co., Allock, Ky. The men used to believe that accidents were "in the cards," and attached no stigma to carelessness. Thirty-four per cent had been injured at least once, a few five times. A conventional safety campaign was instituted with monthly safety meetings and weekly meetings of the supervisory forces; workers were addressed in groups, and the severity rate of 10.60 in 1935 dropped to 3.08 in 1936, which, though unsatisfactory, was the average figure for the entire State.

Electric cap lamps were then introduced on a permissive basis and their adoption was sold to the miners successfully by dint of salesmanship. Though only two small companies in West Virginia in a period of years produced a million tons without a fatality, the Carrs Fork Coal Co. determined to rank with the big companies in safety. Its studies had proved that mines, large or small, in any group having a good safety record, mine more tons per man-shift and at a lower cost than mines with a poor record.

Its men were told that 30 or more of them would be injured every year if the 10 per cent, the average for the industry, should be applicable to the Carrs Fork mines, as it would be inevitably unless they made an effort. Safety letters were mailed to them, first class, and last year only two were injured from falls of roof and sides.

Accident prevention pays more profits for effort expended than any other phase of operation, asserted Dick Ryan, mine safety engineer, Ohio Industrial Commission. Just try to get a wage reduction of 3c. a ton, and note how difficult it is to obtain it. Yet, the safety efforts of the operators who mine about a fifth of the Ohio coal give them this 3c. advantage. Everything depends on the general manager. Accident prevention is like a tack; it goes no further than the head.

Speaking of the dangers of operation of conveyors and mobile loaders, Carel Robinson, consulting engineer, Ward, W. Va., said that (1) a post should be pulled off a conveyor in the direction opposite from its travel; otherwise the conveyor may push the prop against the man who is unloading it; (2) rubber belts may catch fire, and at the surface may set fire to a tippie, if of wood, as the belt will not only burn but carry the flame from place to place; (3) men should be told to stop a burning belt before damage is done; (4) coal spillage under a return chain should not be removed by hand, for something may catch on the chain and the hand be drawn into it; (5) conveyors should not be adjusted when working, and (6) should not run on an intake airway, or dust will be carried back into mine and deposited close to active workings.

Operatives of mobile loaders along the pillar line should stand between machine and rib; then, if roof falls, the loading machine will protect them. Men should push, not pull, on an electric drill, for, if the auger wedges in the coal, the puller may be caught by the whirling drill handle and killed. Electric cables to mobile loaders, conveyors and drills should have ground wires.

A. W. Hesse, mining engineer, coal mines, Youngstown Sheet & Tube Co., anticipated that means will be provided to warn men of approaching roof falls. He suggested placing two pipes, connected by telescoping and forming a single cross beam, across the face of an extending heading, these pipes being of such size and strength as would sustain their weight. Contact with the rib on either side will be assured by a coil spring in each pipe bearing against the end of the opposing pipe. A small box would be placed at midspan with a pushbutton that a short rod would actuate if the rod

should sag at that point to a degree the rod setter believes would be dangerous.

The current, established by pressure of the button, would be of about 1½ volts and 3 milliamperes and would actuate a relay to the rear which could be made to sound a horn or light a lamp, after which current in the primary circuit would be automatically cut off. Incorrect setting due to variation in types and spans of roofs, might make the protection illusory or might indicate danger prior to need; hence the usual method of testing should still be continued.

A vacuum cup, containing a microphone or stethoscope, also might be stuck at a point in the roof where presumably it is weakest. Any sounds of roof action picked up would be conducted to a place of safety where an amplifier and horn would be located, but, for this, sound frequencies made by cutting, loading or drilling machines would have to be eliminated. If that could not be done, the machines could be stopped occasionally, as is supposed to be customary today. Investigation of radio equipment has revealed the Brush piezo electric vibration pick-up that converts vibratory motion into electrical potential.

Aldehyde smells from a safety lamp, due to incomplete combustion, may explain why people persist in believing that methane can be smelled, declared J. T. Ryan, Jr., for himself and W. P. Yant, both of the Mine Safety Appliances Co. Nor are dizziness, headache, nausea or injury to health ascribable directly to methane, but either to lack of oxygen caused by dilution or replacement of air by methane or other gases or to other impurities from powder smoke, as carbon monoxide.

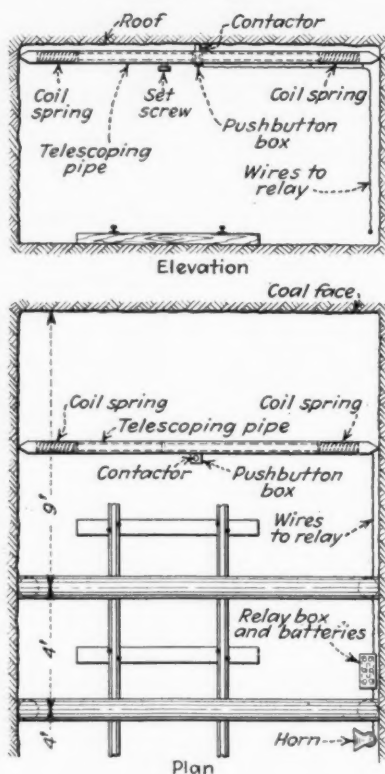
In the hands of experienced men, the Burrell methane detector gave results correct to plus or minus 0.2 per cent and detected methane percentages as low as 0.25. The new indicator can detect methane down to 0.05 per cent and is less affected than the flame safety lamp by lowered oxygen content.

3-Lb. Tester Constructed

A 3-lb. unit has been constructed, known as the Methane Tester, but it is not quite as accurate as the new methane detector. Another indicator, the Methane Alarm, will run for about 16 hours without change of battery and is automatic in operation, mine air being drawn over the filaments by the heat which the passage of the current generates. The impulse which sounds the alarm may be relayed and used in many ways; for example, to close the electrical controls of a section. Similar alarms but of large size and slightly different construction are in daily use in chemical plants, petroleum refineries, etc., operating ventilators, opening and closing doors, controlling electric power, closing down processes, etc.

Though operated under as much as 1,900 ft. of cover and 3½ miles out to sea, the mines of the Dominion Coal Co. are in themselves remarkably dry, declared T. J. Casey, inspector of coal mines, Nova Scotia, reading a paper prepared by S. C. Miffen, office engineer of that company. Much surface water enters the mines through the old workings but is trapped and pumped from points near the shore line. About 4½ tons of water

When the roof sags more than permissible a signal is given.



WHAT'S THE DIAMETER OF THAT SHEAVE?

FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

If there ever was a man who knows how to use wire rope, it's the superintendent here. This AM I asked him what his secret is.

"Just good horse sense," he says. "Take sheaves, for instance. The larger the sheave, the longer the rope will last. Anybody knows that. So I always use the size recommended in your handbook. What's the percentage of saving a few cents on a sheave if it cuts down on the life of the rope?"

He's right. A lot of people using wire rope today would save themselves a pile of grief if they'd just ask first, "What's the diameter of that sheave?"

Yours,

al



TO get the most satisfactory rope life on your equipment, use large sheaves. Undersize sheaves cause high bending stresses which in turn cause wire failures of the square off type (fatigue breaks) to occur.

Another result of small sheaves is accelerated wear. Pressure of a rope on a sheave is inversely proportional to the sheave size. If the sheave is too small, this excessive pressure will cause both rope and sheave groove to wear out rapidly. Small sheaves also reduce rope strength, because the individual strands and wires cannot adjust themselves properly to an unduly sharp bend.

That's why it's vitally important to use sheaves that are of adequate diameter. In general, follow this table. In case of question, our engineers will be glad to consult with you.

WIRE ROPE	SHEAVE FACTOR	
	Recommended*	Minimum*
6 x 7	72	42
18 x 7	51	34
6 x 19	45	30
6 x 21	45	30
6 x 25	45	30
6 x 30	45	30
8 x 19	31	21
6 x 37	27	18
5 x 19	27	18

*times rope diameter



EXCELLAY
Preformed
WIRE ROPE



AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

For Anthracite Service: Miners Bank Building, Wilkes-Barre, Pa.

COLUMBIA STEEL COMPANY

San Francisco

United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL

is raised per ton of coal. The floor of the sea is of rock covered with negligible quantities of silt and no clay. Faults and dislocations are unknown. Eleven fans, usually forcing units, provide 950,000 c.f.m. at water gages ranging to 7½ in.

Number of men on a cage or man-trip is fixed by the deputy inspector; hoist and haulage men are examined by a doctor every six months. Electricity may not be used at the face if the methane content of the air exceeds 1½ per cent. Men are withdrawn by law if the methane content is 2½ per cent, and returns must not have more than 0.75 per cent of methane.

An outstanding achievement in explosion prevention in coal mining was the passing of both bituminous and anthracite mines of the United States through the year 1933 with but one major explosion (five or more men killed); that one disaster resulted in the death of only seven men, asserted G. W. Grove, mining engineer, U. S. Bureau of Mines. Other achievements were the operation without a major explosion of the bituminous mines of Pennsylvania from March 21, 1929, to Nov. 3, 1933, a period of four years, five months and twenty days; the operation of these mines for more than eight years with only one major explosion, and their operation for the last ten years with only three major explosions, these resulting in the death of 26 men.

Explosions Radically Reduced

The mines of West Virginia worked from Nov. 3, 1931, to Sept. 2, 1936 (four years and ten months), without a major explosion, though a fire in 1935 killed six men. During the last seven years only two major explosions occurred in that State, resulting in the death of 28 men, both in the same mine.

If Pennsylvania and West Virginia, which produce over half of the nation's bituminous coal, can establish such records in explosion prevention, why should not the rest of the country do equally well or better? A whole year had passed last April since the last major disaster to date occurred in the bituminous mines of the United States. Mr. Grove described the explosions in American mines in 1937-1939 without giving company names, dates or States of occurrence. At the opening session H. N. Eavenson, consulting engineer, Eavenson, Alford & Auchmuty, recited historical facts about the development of the coal industry in Pennsylvania.

Bill 2420, introduced by Senator Neely, empowering the U. S. Bureau of Mines to enter mines, inspect and report on them, was discussed frequently, always adversely. In the course of the sessions, a resolution asking for delay in action on the bill was telegraphed to members of the Committee on Mines and Mining of the Senate. This bill means duplication of service, added taxes, and a confusion of authority that will decrease safety, declared J. I. Thomas, secretary, Department of Mines of Pennsylvania. An interpretive decision of Elmer Andrews, administrator, Wages and Hours Division, Department of Labor, ruling that men are entitled to time and-half for attending meetings to discuss details of industrial operation received much unfavorable comment; members declared that it

Fuel Man Captures Selling Honor

Honorable mention for distinguished salesmanship during the last year has been awarded by the Beata Quota Fraternity to David Lukoff, of the Philadelphia Coke Co., with a total of 2,354 sales units for 1938. A feature of Mr. Lukoff's achievement was the fact that during the sweltering summer fill-up campaign, lasting 40 days, he wrote 870 orders for Koppers coke and got \$1 down on each contract.

would practically destroy safety work. Many attorneys, they said, claimed that, even if the men undertook first-aid training on their own volition and the companies provided supplies or meeting rooms, the operator under the decision would have to pay time and a half. A resolution asked for a revision of the administrator's ruling.

On behalf of the Joseph A. Holmes Safety Association, Dan Harrington, U. S. Bureau of Mines, presented an award to B. H. Schull, general manager, for the Pyramid Coal Corporation, a stripping concern, signaling its production of 12,500,000 tons of coal and the stripping of 127,500,000 tons of overburden, or over 140,000,000 tons in all, without a fatality; non-fatal accidents also were few. Of the cover, 58.54 per cent was surface material; 17.07 per cent, shale rock, and 24.39 per cent, limenrock, explained Mr. Schull. Members visited the factory of the Mine Safety Appliances Co.

Demonstrations at the experimental coal mine at Bruceston, Pa., showed how a coal fire could be quenched more effectively by rock dust than by water, that coal dust can be exploded in a model by a spark from a 12-amp. current, also in a mine car both on the surface and in the portal of the mine, in which latter the violence was greater. When 60 per cent of rock dust was mixed with the coal, no explosion occurred.

OFFICIAL ROSTER FOR 1939

President, Thomas Allen, chief inspector of coal mines of Colorado, Denver, Colo.; first vice-president, James McSherry, director, Department of Mines and Minerals of Illinois, Springfield, Ill.; second vice-president, Thomas Moses, vice-president, United States Steel Corporation of Dela., Pittsburgh, Pa.; third vice-president, N. P. Rhinehart, chief, Department of Mines of West Virginia, Charleston; secretary, C. A. McDowell, personnel director, Pittsburgh Coal Co., Pittsburgh, Pa.; assistant secretary, J. J. Forbes, supervising engineer, U. S. Bureau of Mines, Pittsburgh, Pa.; treasurer, C. J. Rowe, district mine inspector, Westernport, Md.; editor-in-chief, J. W. Paul, mining engineer, Pittsburgh, Pa.; assistant editor, Richard Maize, district mine inspector, Uniontown, Pa.; editor-in-chief, emeritus, J. T. Beard, Danbury, Conn.; publicity director, R. D. Hall, engineering editor, Coal Age, New York.

Other tests showed how a single stick of 40-per cent gelatine dynamite in a pile of 25 lbs. of coal dust outside the mine will ignite the latter. The explosion was spectacular but not violent, but when reenacted 200 ft. inby the portal of the mine with 700 lb. of coal dust spread in shelves from the portal to a point inby the dynamite, an old car in the mine mouth was thrown out of the mine about 200 ft. before alighting.

Prevent Smoke in Fuel Bed, Says Battelle Report

The best way to keep furnace chimneys free from smoke is to prevent smoke formation in the fuel bed; and underfeed stokers, because they are designed to do this, are essentially smokeless in operation, was the gist of a report by research engineers of Battelle Memorial Institute, Columbus, Ohio, at a meeting on June 14 of the Smoke Prevention Association at the Hotel Schroeder, Milwaukee, Wis. The report also suggested that smoke ordinances of some cities are needlessly restrictive in demanding certain furnace volumes and often require useless expense to obtain them.

The report is the result of an extensive field survey of stokers in actual operation made last winter in Columbus, St. Louis, Mo.; Cincinnati, Ohio, and Chicago by Battelle research engineers. Sponsors of the work were the Stoker Manufacturers' Association, Institute of Boiler and Radiator Manufacturers, Steel Heating Boiler Institute, and the National Coal Association. Several hundred fuel engineers, including smoke inspectors, technicians from government bureaus, universities and other institutions, representatives of the coal industry, and manufacturers of heating equipment heard the report.

Firebox Design vs. Smoke

The purpose of the survey was to find how freedom from smoke is related to size and height of firebox, for which minimum figures are specified by some city ordinances. The survey engineers, R. C. Cross and H. N. Ostborg, employed specially designed portable test equipment in which a photo-electric cell, or "electric eye," gave an accurate continuous record of the smoke going up the stack. Flue-gas analyses and rates of coal feed also were determined on the job, and the supposedly critical combustion space and setting height likewise were measured.

The stokers studied were in homes, apartment buildings, laundries and small industrial plants. More than 100 were investigated, and 22 were subjected to full 24-hour continuous test. Only about one out of eight was found to be producing smoke sufficient to make a possible violation of smoke ordinances, and no such violation, it is stated, could be traced to small combustion space or low setting.

Coal fired by stokers, according to the Battelle report, is likely to cause smoke only when manual attention is given to the fire or when the stoker shuts off, and no amount of combustion space could eliminate smoke caused in these ways. Elimination of the tendency of stokers

HOW TO GO 300FT. IN CONVEYOR MINING WITHOUT A BREAK-THROUGH



TODAY the use of "Ventube"* ventilating duct in conveyor mining makes it possible for you to drive rooms and butt entries 300 feet long. It eliminates the necessity for cutting expensive break-throughs every 80 feet. Cuts down on the number of permanent brattices to be built. And saves you from taking out tons of additional rock in order to get fresh air to your workings.

All you do is string "Ventube" along the timbers. Run it from a natural air-way to the face. Attach a small blower to the tubing. And watch how quick it gets rid of coal dust!

"Ventube" ventilating duct is made of extra-heavy, long-fibered Hessian cloth that's both coated and impregnated with rubber that won't peel off. It's resistant to acid water, damp or dry rot, fungus and mine gases. And

costs very little. In fact, with "Ventube" you save so much by eliminating cross-cuts that it pays for itself in no time at all.

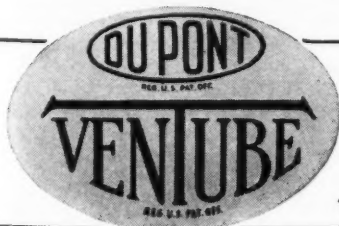
"Ventube" handles easy. Hangs out of the way. Takes up little space. Slides back from the face quickly and easily when blasting. One man can carry 100 feet without difficulty—so it never ties up needed mine cars.

● Although "Ventube" works just as well in thick seam mines, low vein coal is where "Ventube" gets the toughest test—where ventilating is particularly bad—where the veins run on broken, uneven strata—where there's hardly room to crawl on your hands and knees. If you've a mine like that—by all means look into "Ventube" today!

● Du Pont also makes a line of powder bags from the same material as "Ventube." Write for prices, sizes and full information.

Install a few sections of "Ventube" in a heading where you're having the most trouble with dust. See it in action. We promise you—the results will be so surprising that you'll wonder why you haven't thought of "Ventube" earlier. Ask du Pont to give you an estimate.

**"Ventube" is du Pont's registered trade-mark for its flexible rubberized mine ventilating duct.*



E. I. DU PONT DE NEMOURS & CO., INC.

"Fabrikoid" Division

Fairfield, Connecticut

THE FLEXIBLE VENTILATING DUCT

to smoke when shutting down to await renewed demand for heat was characterized as a distinct challenge to the ingenuity of the stoker manufacturer.

Ralph A. Sherman, supervising fuel engineer at Battelle and co-author with Messrs. Cross and Ostborg of the report, recommended further research, saying that many factors other than combustion

space and setting height would have to be studied under controlled conditions. Among those which appear to be equally or more important are adjustment of air supply, provision of excess air for shut-down periods, effect of various types of coal, and equally various types of service for which stoker-fired heating plants are installed.

Commission Submits Proposed Prices Subject to Final Hearing

WASHINGTON, D. C., June 26—The National Bituminous Coal Commission approved for publication on June 16 minimum prices for Minimum Price Area 1, which produces approximately 70 per cent of the nation's bituminous coal. They are subject to final hearing before becoming effective. The prices, which include those for the Appalachian field, are generally lower than the first minimums established by the Commission in December, 1937, and January, 1938. The quotations for certain coals, however, are substantially higher than the present market prices, while prices for other coals are somewhat lower. The quotations range from \$1.15 per on f.o.b. mines for the lowest grade, smallest size of slack coals to \$3.35 for the finest grade, largest size of lump.

Prices for Areas 2-5 Proposed

Minimum prices ranging from \$1.15 to \$4.80 a ton were proposed by the Commission on June 25 for coal in Areas 2, 3, 4 and 5, comprising the Central, Southern and Southwestern States. Prices for most coals produced in Arkansas, Missouri, Iowa and Alabama, according to the Commission, "generally reflect present market levels." In Illinois, Indiana, western Kentucky, Kansas, Texas, Oklahoma and parts of Tennessee and Georgia general increases were shown for industrial coals, but domestic figures show little change. Generally, prices proposed for low-grade industrial slack and for lump coals were lower, while figures for better grade slack remained about unchanged from prices recommended by the Commission a year and a half ago.

Determination of weighted average production costs for the entire United States was completed with the announcement by the Commission on June 15 of figures for Minimum Price Area 1. The average for the area as a whole is \$2.128 per ton, compared with \$2.15 when prices were set about a year and a half ago. Costs by districts are: District 1 (central Pennsylvania and part of Maryland), \$2.389; District 2 (western Pennsylvania), \$2.214; District 3 (northern West Virginia), \$1.837; District 4 (Ohio), \$1.936; District 5 (Michigan), \$3.654; District 6 (West Virginia Panhandle), \$1.978; District 7 (southeastern West Virginia and part of Virginia), \$2.194; District 8 (southwestern West Virginia, eastern Kentucky, western Virginia and northeastern Tennessee), \$2.030.

Average cost for Minimum Price Area 2 is \$1.76 a ton, as against \$1.79 eighteen months ago, the figures by districts being: District 9 (western Kentucky), \$1.58; District 10 (Illinois), \$1.756; District 11

(Indiana), \$1.652; District 12 (Iowa), \$2.763. These figures were disclosed on June 12. For Minimum Price Area 3 (Alabama, Georgia and southeastern Tennessee), the cost, announced May 29, is \$2.44; Area 4 (Arkansas and the counties of Haskell, Leflore and Sequoyah in Oklahoma), \$3.61; Area 5 (Missouri, Kansas, Texas and all of Oklahoma except the counties in Area 4), \$2.04.

Registered coal distributors will be required to charge prices not less than the minimum in effect at the time that coal they sell under contracts is delivered, the Commission made known on June 9. Marketing rules and regulations include this requirement in the case of producers who sell through sales agents or make their own sales. This ruling is to prevent evasion of the provision of the coal act prohibiting delivery of coal upon any order or contract at a price below the minimum in effect at the time of delivery.

The rules and regulations, issued June 6, were designed to eliminate unfair trade practices. At the same time, the 30-day contract restriction was relaxed to permit contracts up to a year to meet long-term competition with other fuels, to sell to government agencies, "or for such other reasons as the Commission may deem appropriate." The rules and regulations will go into effect when minimum prices are promulgated.

Final hearing on the establishment of minimum prices in Districts 16-20, 22 and

23, which began at Denver, Colo., on May 19, was concluded on June 2.

Elections have been held by a number of district boards, with the following results: No. 1—Present board reelected except that Rembrandt Peale replaced J. H. Allport and Malcolm McAvity succeeded J. E. Graham; No. 2—existing board reelected except that G. B. Seyms replaced E. B. Leisenring and George S. Baton took the place of G. T. M. Stoneroad; No. 3—E. C. Payne replaced S. P. Burke, the remainder of the existing board being reelected; No. 4—new rail-mine and a new truck-mine representative named, the remainder of the old board being retained; No. 6—Louis Yaeger replaced R. J. Cotts and Thomas Courtney succeeded E. J. Mathiott, the rest of the old board being continued; No. 7—old board reelected except that J. Walter Carter replaced H. J. Jacobi; No. 8—A. F. Allan, J. A. Kelly and J. E. Johnson Sr. replaced R. H. Kelly, A. Downing and George P. Fitz, respectively, the rest of the old board being reelected.

With the functions of the Commission scheduled to be transferred to the Secretary of the Interior early in July, F. W. McCullough, secretary of the Commission, notified Mr. Ickes on June 1 of his desire to be relieved of his duties as soon as feasible—unless cooperative requirements during the transition period make his services necessary. In that event, he assured Mr. Ickes, he was willing to remain for a reasonable time.

Better Methods and Standards Goal of Heating Group

Improvement in methods and the development of higher standards in design, manufacture and installation of equipment was the keynote of the mid-year meeting of the National Warm Air Heating and Air Conditioning Association, held June 5-7 at the Hotel Stevens, Chicago. The sessions had an attendance of more than 350. In connection with the convention theme President Taylor announced that the association is cooperating with the Federal Housing Administration in preparing a standard code covering heating and air-conditioning equipment for homes covered by F.H.A. loans, for use of F.H.A. inspectors.

A report on "Elimination of Waste in Our Industry Through Standardization" was made by Perl S. Miller, Columbus, Ohio; and B. F. McLouth, Lansing, Mich., spoke on "Our Installation Codes and Matters Pertaining to the Same." K. C. Richmond, editor of *Coal Heat*, reviewed the market situation in the heating and air-conditioning field, concluding that courage, foresight and intelligent planning would assure an immense volume of profitable business in modern heating equipment and accessories.

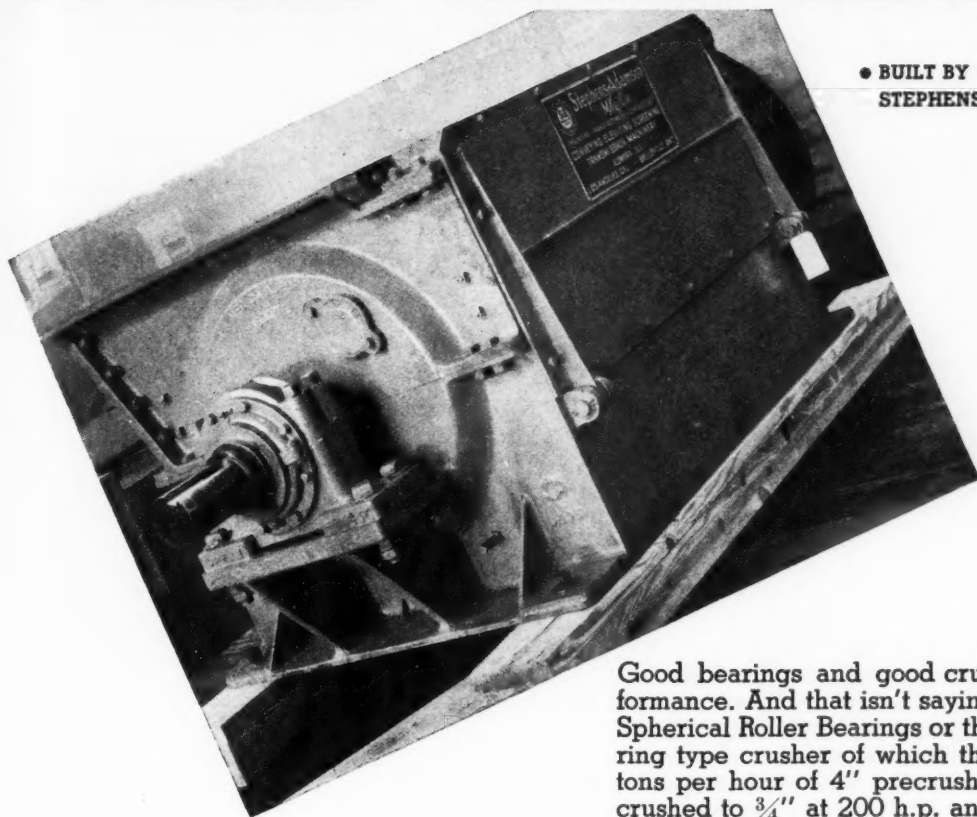
Professors Kratz and Konzo, University of Illinois Engineering Experiment Station, reported on a year's work at the association's "research residence" at the university, establishing definitely that stoker operation is entirely practicable and economical with forced warm-air heating and developing valuable data on the best operating practice for economy and over-all efficiency of heating system.

Studies of problems of rating and baffling forced warm-air furnaces, aimed at

Sales of Mechanical Stokers Drop Below Year Ago

Sales of mechanical stokers in the United States during April last totaled 3,591, according to statistics furnished the U. S. Bureau of the Census by 101 manufacturers (Class 1, 51; Class 2, 31; Class 3, 27; Class 4, 21; Class 5, 13). This compares with sales of 3,827 (revised) in the preceding month and 3,628 in April, 1938. Sales by classes in April last were: residential (under 61 lb. of coal per hour), 3,006 (bituminous, 2,608; anthracite, 398); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 220; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 201; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 115; high-pressure industrial steam plants (more than 1,200 lb. per hour), 49.

IT'S A GOOD CRUSHER BECAUSE IT HAS GOOD BEARINGS



• BUILT BY
STEPHENS-ADAMSON MFG. CO.

Good bearings and good crushers give *dependable* performance. And that isn't saying too much for either **SKF** Spherical Roller Bearings or this rugged 34" x 36 $\frac{3}{4}$ " Knittel ring type crusher of which they are a part. Crushing 500 tons per hour of 4" precrushed bituminous coal to be re-crushed to $\frac{3}{4}$ " at 200 h.p. and a rotor speed of 700 r.p.m. speak well for *both*.

The self-aligning feature makes the **SKF** Spherical Roller Bearings *different* from other types of roller bearings. Not only does it permit excessive shaft movement without binding, but it assures full capacity for useful work at all times. It's the result of manufacturing skill coupled with fundamental technical knowledge that *is* **SKF**. Your equipment deserves **SKF** Bearings, too.

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SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA.

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clearing the ground for development of codes and performance standards for protection of the consumer, were the subjects of a report by Prof. Lorin G. Miller, Michigan State College. Other papers were: "Don't Oversell Clean Air Delivery," Jan S. Irvine, Toledo, Ohio; "Cooling With Air Movement," B. G. Krause,

Cleveland, Ohio; "Air Filtration in Connection With House Dust, Hay Fever and Pollen Asthma Allergy," Dr. William H. Welker, University of Illinois College of Medicine; "Two-Speed Blower Operation," H. F. Curtis, Cleveland, Ohio; "How Best to Help the Dealer Sell," William Cook, Des Moines, Iowa.

Illinois Coal Men Consider Foremanship, Cleaning and High-Speed Hoisting

WITH a capacity crowd of members and guests of the Illinois Mining Institute aboard for a discussion of injury prevention from falls, the effect of high-speed operation on hoisting-equipment maintenance, the qualities a mine foreman should possess and preparation of coal at the new Westville No. 24 plant of the Peabody Coal Co., the Steamer "Golden Eagle" left St. Louis, Mo., June 9, on the institute's 21st annual boat trip and summer meeting. Technical sessions on June 10 were presided over by Roy L. Adams, general superintendent, Old Ben Coal Corporation, West Frankfort, Ill., and F. A. Miller, assistant to the president, Franklin County Coal Corporation, Inc., Herrin, Ill. Thomas Moses, retired president of the H. C. Frick Coke Co. and other coal subsidiaries of the United States Steel Corporation, and Eugene McAuliffe, president, Union Pacific Coal Co., were unanimously elected honorary members of the institute in view of their long and honorable service to the coal industry.

Changes Contribute to Falls

Calling attention to some of the more frequent causes of falls of roof and face, and methods of preventing them, Ben Pitts, State mine inspector, Odin, Ill., expressed the opinion that "the revolutionary changes which the mines are going through, or have gone through, from hand to mechanical loading have thrown workmen off balance and schedule for a period of time. And in some instances the supervisors have been in a quandary as to the mining system and method to adopt which would be best suited to their individual needs." All these contribute more or less to roof falls, which are responsible for about 50 per cent of all injuries in mines. "In any industry where half the fatal injuries are attributable to any one known cause, it demands serious consideration and thought in an effort to reduce these accidents."

Investigation of injuries from falls of roof and face show they occur in several ways, such as failure to sound and examine properly, set properly the necessary timbers, including safety timbers, take down loose coal and square up the working face and, where mechanical loading is done, failure to stop the machines and sound and examine roof and face at regular intervals. But one underlying cause difficult to explain is "why some men persistently take their lives in their hands . . . by working under roof or overhanging face they know to be dangerous."

Roof conditions in Illinois mines are an ever-changing problem and in some

cases these changes are pronounced in a very short distance, necessitating a complete change in timbering methods. Changes in the temperature of and moisture content of the ventilating air is another difficulty where the roof is poor. Too large an opening or too small a pillar will induce squeezes and cause roof falls. Consequently, adoption of a



While B. E. Schonthal (left), institute secretary, looks over the agenda; Paul Weir, president, gets ready to open the proceedings

safe plan of development is essential in order that the roof be supported properly. And where the air tends to affect the roof, leaving sufficient coal for support or systematic timbering will help. Gas or water in the roof may be relieved by drilling holes at regular intervals to release the pressure. Proper placing of shots is important, particularly under a frail top.

"The mine examiner plays a very important part in the general safety of our mines. He should make a thorough examination of every working place in the mine and should be allowed sufficient time to make such an examination, for to determine the security of the roof in working places it is necessary to inspect carefully the surroundings, note particularly the condition of the supporting timbers, observe closely the effect of roof pressure on pillars, study well the character of the roof, and watch closely for any slips or fault lines. Too much reliance should not be placed on sounding the roof, which does not always reveal an unsafe condition. Greater dependence should be placed on a careful inspection of its condition and that of the supporting timbers and pillars, guided by a knowledge of the roof action gained by experience.

"Injuries resulting from face falls, especially in my district, can be attributed mostly to failure to properly square up

the working face," thus failing to bring to light slips and other weaknesses which permit the coal to loosen and fall off, especially when it is being undercut. In some cases, however, unsuitable explosives are used or shots are not placed properly. Systematic spragging of the face is necessary in working a brash, brittle coal, and of course the rules as to sounding and examination apply here as well as in the case of roof hazards.

Comparing the coal industry to an ancient forest, John E. Jones, safety director, Old Ben Coal Corporation, presented a fable to point up his contention that too little attention has been given to the causes of the greater part of the fatalities. "Gassus," "Coldustus," and their camp follower, "Monoxus," make the headlines and get the lion's share of attention from the authorities, but still kill only 10 per cent, whereas, "Roofus" and "Ribbus" slay one or two at a time and therefore in spite of taking a toll of 50 per cent, attract little public attention. Deplored the fact that about the only method of determining the potential hazard is sounding. Mr. Jones declared that the time is ripe for the application of scientific discoveries to the problem.

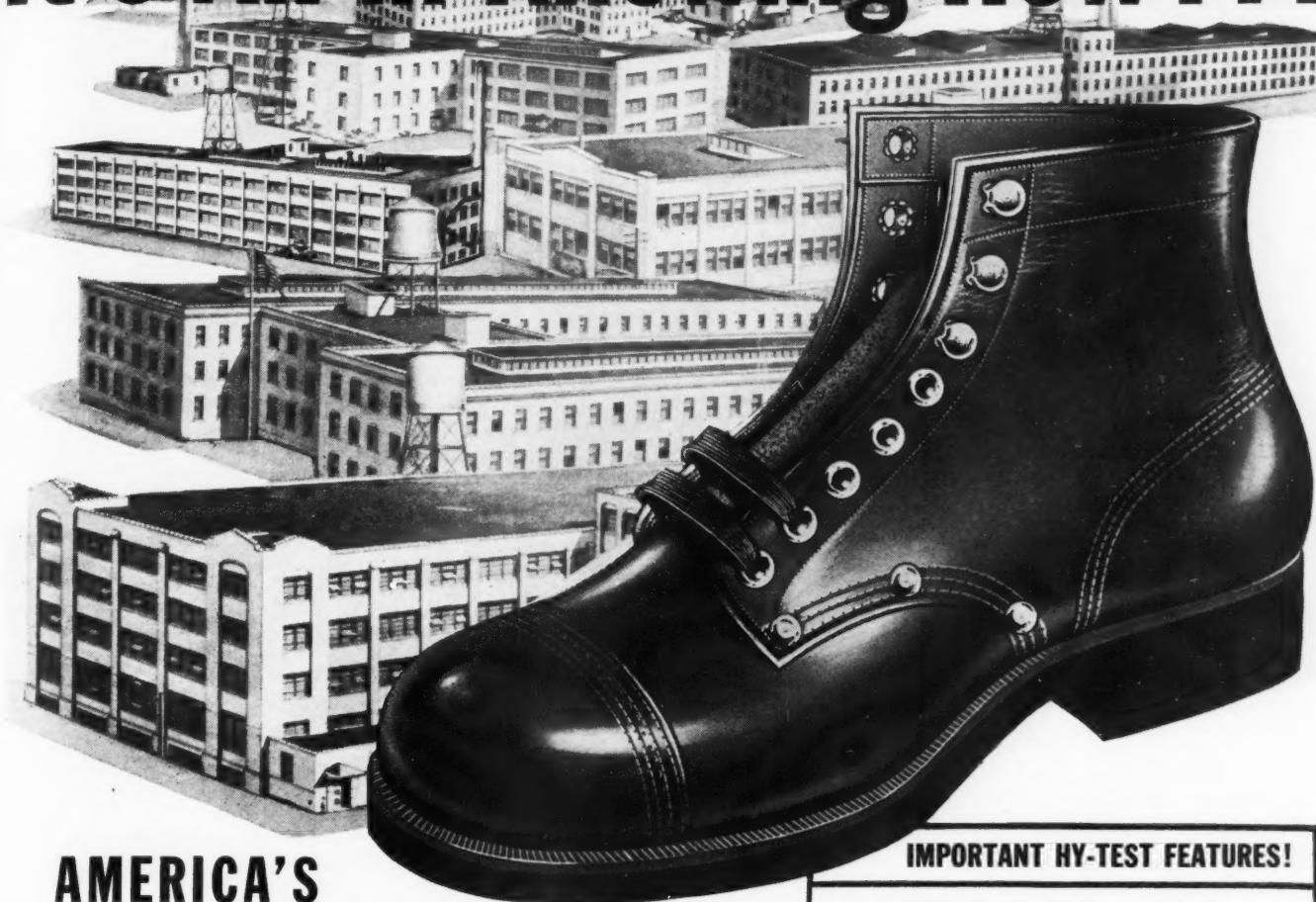
Plan Study of Roof Falls

As a result of a preliminary investigation, the staff of the Illinois Geological Survey expects this summer to study several mines with the idea of finding out how the geological aspects of the seam and the adjacent strata may affect safety, declared Dr. M. M. Leighton, director. This project was approved by Mr. Jones, who stated that a little work had been done as far back as 1914, although much more is required. Falls of roof and ribs also bring the problem of man and management failure, said T. J. Thomas, president, Valier Coal Co., Chicago, in asking if education would not improve the situation. Man failure was recognized as a factor by Dr. Leighton, who made the point, however, that if more was found out about the nature of the hazards it would facilitate the educational process. At his suggestion, the institute approved the organization of a coordinating committee to keep in touch with all work of this character so that the results could be made available as fast as they were released.

Noting that victims of roof and rib falls usually are men with long experience in the mines, Mr. Adams expressed some doubt about assuming that experienced miners are the safest. That particular point may be the best evidence of the need for a scientific study of roof and face. Paul Weir, consulting engineer, Chicago, called attention, on the other hand, to the good results already obtained in a number of mines by instilling in the minds of employees a desire to work safely.

The effect of higher speed on cage and hoist maintenance was illustrated by Dale Carter, superintendent, by a history of hoisting at the No. 2 mine of the Bell & Zoller Coal & Mining Co., Zeigler, Ill. The original tippie and preparation plant, designed for a maximum output of 5,000 tons per day, was erected in 1918. The headframe accommodated tandem-mounted 8-ft.-diameter sheaves. Eagle

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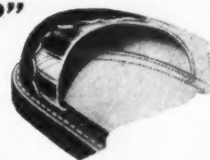
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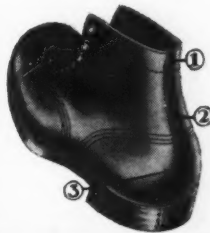
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Speaker get-together. Dale Carter (left), M. K. Herrington, who battled for Dr. J. J. Rutledge; Ben Pitts and Jack R. Verhoeff talk things over

self-dumping cages weighing 8 tons and equipped with Nolan automatic horn steps and locks were handled by 28x42-in. Litchfield hoisting engines (125 lb. working steam pressure). These engines were directly connected to an 8-ft. straight drum with a 44-in. grooved face equipped with steam-operated reverse and brakes and a Welsh overwind safety device. Originally, 1½-in. 6x19 regular-lay hemp-center ropes, long enough for 3½ dead and 14½ active turns on the drum and for nine rope clamps on 9-in. centers on the cage end, were used.

Two loaded tracks with a capacity of 110 cars are included in the bottom arrangements and loads are fed to a Nolan automatic cager by a 10-ton push motor operating between the loaded tracks. The signal system is of the air-bell type. For cage landings, 12x12-in. white-oak timbers and concrete bases were used. Empties bumped off the cages run by gravity to two tracks. The first mine cars were wood with roller-bearing axle boxes, 3-in. axles, 18-in. cast-iron wheels and Mac-whyte male-and-female couplers. They weighed about 2 tons each and, hand-loaded, held about 4½ tons.

After 1918, coal demand was good and a decision was made to expand production, which was done by taking out bottle necks. Hoisting engines and drum are located so that the ropes operate at an angle of 45 deg. With a straight high-speed drum, this results in unusual strains on all hoisting equipment (engines, ropes, sheaves, cages, dumps and landings). Cages were the first difficulty in speeding up the hoist. Bails, deck sides and dump-roller shafts broke frequently and the springs and other parts of the car locks were too light, also true of the dumping quadrants. Practically every part of the cages was replaced with heavier material. Casting sizes were increased and steel was used. Structural-steel parts were made heavier, and shafts, chains and pins were replaced with alloy-steel units. These changes raised cage weights from 8 to 11 tons.

Rope size was increased to 1½ in., accompanied by a corresponding change in sheaves, which were equipped with chrome-vanadium-steel axles, as several 8-in. cold-rolled axles had broken and caused expensive wrecks. It also was found necessary to strengthen tippie and headframe, after which the hoisting en-

gines came in for attention. Original cylinders and bed frames were replaced with heavier castings more securely anchored. And, in addition to the regular stud bolts, heavy steel-bar clamps were installed to hold the units more rigidly in alignment. Hoist-drum bearing metal containing nickel was substituted for the old type and a forced-feed oil pump was put on the drum bearings, improving lubrication and saving about 5 gal. of oil per day. Pulling cars up against the brow at the shaft bottom was eliminated to a large extent by a control line for the use of the cager, which actuates a magnetic auxiliary release on the Welsh overwind to close the throttle and apply the brakes.

The average hoisting cycle is: acceleration, 5 sec., 137 ft.; running, 1½ sec. at 3,570 f.p.m., 89 ft.; deceleration, 5 sec., 144 ft.; rest, 3½ sec. Total lift is 370 ft. After bringing the installation up to snuff, a record of 2,011,379 tons in 280 days was made in 1926, requiring 450,028 dumps (4.47 tons per car), or one per 17.9 sec. over the year. Fourteen hoisting ropes costing \$7,000 were used. Average tons per rope was 143,670, making rope cost 3.4 mills per ton. On Jan. 6, 1928, a record of 1,852 hoists (4.59 tons per car, or a total of 8,505 tons) was made under hand-loading conditions. Average hoisting time was 14.9 sec. per car.

A new preparation plant was built in 1935 and mechanical loaders were installed along with a number of new steel cars with improved anti-friction bearings in light cast-steel wheels. Weight of these cars was 5,000 lb., compared with 4,000 for the previous type. Tons per car decreased from about 4.5 to 3.5, with a much greater variation in weights of individual cars. "The smooth working of the hoisting cycle was disrupted by this variation in unbalanced load . . . Cage landings and dumps were subjected to unusually abusive service. These conditions were improved by loading the cars, as far as practicable, to a uniform weight. Gum timbers decked with 2- and 3-in. steel plates eliminated most of the cage-landing troubles. Our best hoisting record for a 7-hour day is 1,600 dumps with 11 minutes lost time. Average hoisting time was 15.3 sec., total tonnage was 6,248 and car average was 3.9 tons."

Hoisting is done by two engineers, who

interchange between material and coal hoists every 1½ hours. Seven men comprise the bottom crew, with four men regularly on maintenance of tippie, shaft and cages—mostly the latter. Because of high-speed hoisting with its sudden starts and stops, cage and rope life are short. Cages are good for 450,000 tons and ropes for 150,000 tons. At No. 1 mine, where coal is hoisted in 9-ton skips by a stepped-drum hoist, skips are good for 900,000 tons and ropes for 450,000 tons. Experiments now are being conducted on the use of high-tensile steel for some cage parts originally built of common structural steel. Increased strength and reduced weight are expected to result in "longer life for both our cages and ropes."

Responding to questions, Mr. Carter stated that ropes and cages are examined every evening. Five broken wires in 24 in. in any one strand are the signal for a change. Tonnage and any accidents which might result in an unusual strain on the rope also are taken into consideration in determining time to change. Ropes ordinarily are not cut off and re-clamped but clamps occasionally are moved. Bridle chains, clevises, etc., are not annealed but instead are removed if the daily inspection shows any condition which might affect safety. Total weight of the cage, car, rope, etc., is around 17 tons. Much trouble was encountered with bails, with the result that alloy steel now is used.

Daily inspections also are the rule at the Franklin County Coal Corporation mines, said Mr. Miller in discussing when to take off ropes. One factor, he declared, is cessation of stretch. Consequently, a running record is kept of stretch, and this together with tonnage, accidents and broken wires, determines rope-changing time. Only after records were kept did the company begin to get a fairly uniform rope life. Bridle chains are annealed from time to time.

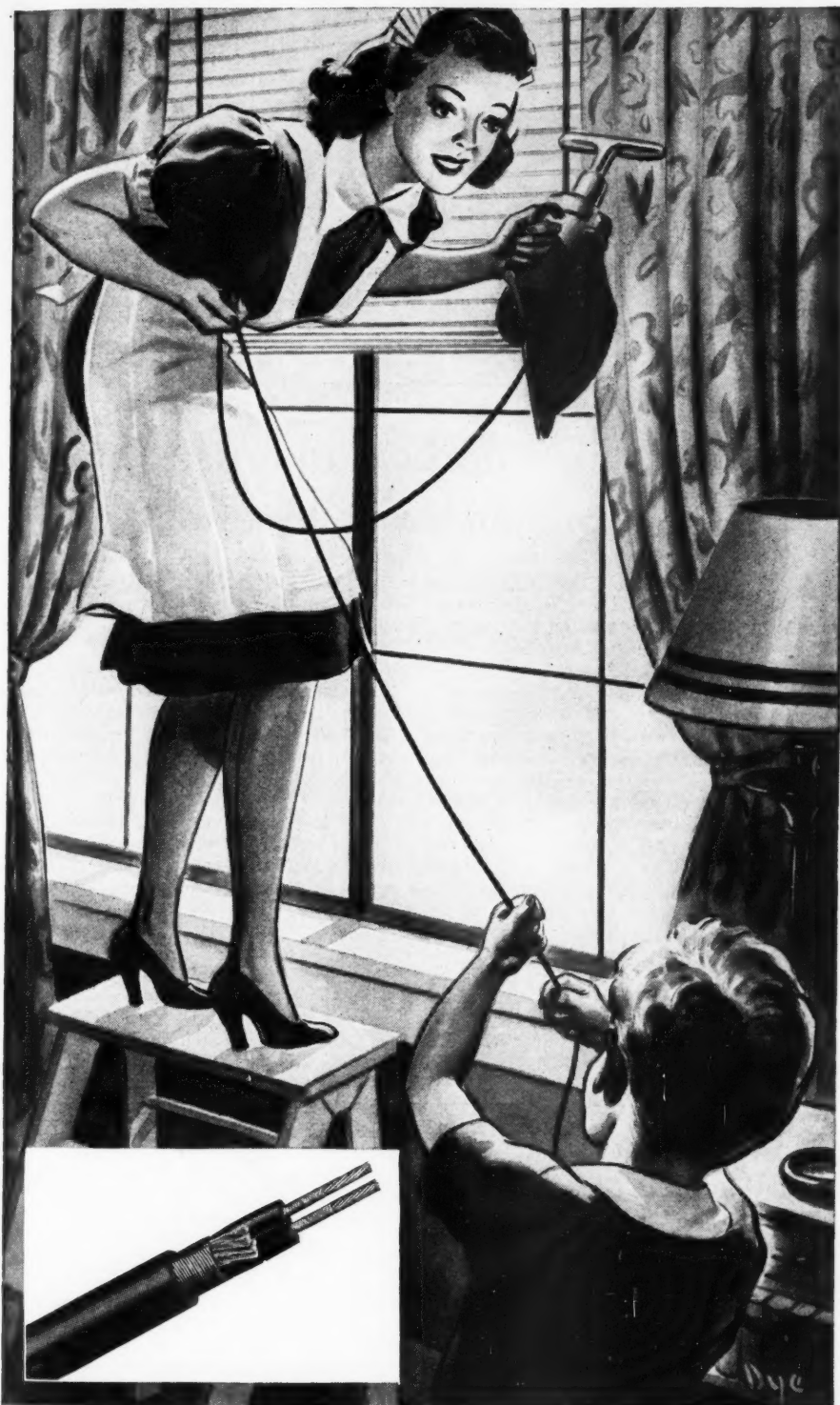
Foreman Under the Glass

"What kind of a man would I like my mine foreman to be?" Asking this question, Dr. J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, Baltimore, Md., in a paper read by M. K. Herrington, Illinois Department of Mines and Minerals, Springfield, put himself in place of the miner and answered it in part as follows:

"First, I would like him to be a real man—honest, open and aboveboard, to have the courage of his convictions and to stand up for them. Brave, but not quarrelsome; firm, but not contentious. I would not want him to harbor grudges against me or any other mine employee, for grudges always dwarf a man's character. My mine foreman should be able to forgive and forget. My foreman should never lose his temper under any circumstances, for when he is angry his judgment is not good.

"I would want him to be fair in his dealings with me and other mine employees and I would try to be fair with him. I would want to have payment in full for all the coal I loaded, for all the yardage driven and for all the deadwork covered by the working agreement, but I would not expect him to pay me more than was rightfully due me. I believe in reciprocity. If I did good work I

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would expect him to tell me so ungrudgingly and promptly . . . On the other hand, if my work is not done properly, I would want him to tell me so and tell me only. . . .

"I would expect to be disciplined and would not object to discipline properly and fairly administered. . . . One matter I would insist upon and that would be a cheerful, civil greeting. . . . I would want my share of work when work is slack, but I would not want him to give me more than my share. . . . I would not want my foreman to grant me special favors or be partial to me. I would want him to be civil in his dealings with me but I would not want him to lower his dignity" by undue familiarity. "Never, under any circumstances, would I want my foreman to tell others—especially my buddies—of my faults and shortcomings and not tell me. . . . I would not want my foreman to be two-faced. . . .

"I would expect my foreman to be positively interested in the prevention of mine accidents and the promotion of teaching and application of first-aid. . . . I would want the foreman to meet and greet the state mine inspector civilly. . . . accompany him on his inspection and furnish all information requested. . . . I would like the foreman to respect the privacy of my home and, since I believe in reciprocity, I would want to respect the privacy of his home" and not discuss mine matters with him when he is off duty.

"I would want the foreman to be efficient and impartial in his management of the mine," so that it would continue to operate profitably and so that labor disputes would not result in lost working time. "I would expect the foreman to keep me from having accidents and make me exercise care, but if I did have an accident I would want him to be able to render first-aid and get me to a doctor as soon as possible. . . .

Safety Promotion Essential

"I would expect the foreman" to keep the mine in good condition and foster the use of protective equipment. "I would do my part and urge my buddies to do theirs in keeping the safety equipment in the most serviceable condition. I believe it would be fair if the company installed a change house and operated a man-trip. And I would do my best to see that no employees committed any depredations in the change house and that all concerned conducted themselves in an orderly manner in and about the man-trip. . . . You say that foremen such as I have described are not real. . . . Well, mister, you're wrong; way wrong."

Pointing out that work on the drawings was started on June 1, 1938, and that the plant was completed on Feb. 1, 1939, Jack R. Verhoeff, construction engineer, Peabody Coal Co., Chicago, described briefly the operation of the new 600-tons-per-hour mechanical preparation plant at his company's Westville No. 24 mine in the Danville district of Illinois. (Description of this plant is given, pp. 44-48, in this issue). The plant is fifth in the Peabody series and comprises seven sections, as follows: main headframe and tippie, dry-preparation division, wet-preparation division, loading shed, de-watering-bin unit, retail bins for plus 2-



F. A. Miller (left) and Roy L. Adams, who presided at the technical sessions, have a little serious conversation

in. and a rescreener, reassembly plant and retail bins for minus 2-in. prepared coal.

In the discussion following his paper, Mr. Verhoeff stated that there were two major reasons for dedusting the feed to the washer: (1) to keep the fines out of the washing system and (2) to make reclamation of the wash water easier. With an inherently low ash content from the mine the latest preparation plant of the Consolidated Coal Co., said G. S. Jenkins, general superintendent, Herrin, Ill., does not involve washing. Consequently, preparation gets down to a problem of dedusting. As sizes are getting smaller, the plant is designed so that the entire mine-run feed can be reduced to minus 1-in. and dedusted at 8-mesh. The primary crusher is a ring unit, with a double-roll secondary unit. Arrangements have been made so that the duties may be reversed to get a comparison of crushing performance. The new Consolidated plant, also commented M. S. Lambert, Robins Conveying Belt Co., Chicago, is designed for straight-line operation, and the units are arranged so that capacity may be increased or practice changed by simply adding onto the plant.

Partnership With Coal Industry Shown At Stoker Men's Meeting

PRACTICAL means of expanding the sales of automatic coal stokers were discussed in great detail at the meeting of the Stoker Manufacturers' Association, held June 1 and 2, at French Lick Springs, Ind. Executive members of the association devoted a large portion of their time to consideration of a national advertising and public relations program which had been prepared by the association's advertising committee and Marc G. Bluth, secretary. Final action was deferred until October, when the association executives will again meet to consider this subject.

At the opening session, President E. C. Sammons reported on the progress of the stoker industry in general and severely criticized the spending program of the Government and the burden placed on stoker manufacturers, dealers, distributors and users in increasing taxes, thus making it impossible to pass on to the consumer savings in manufacturing and selling costs, which would be possible but for this factor. Mr. Sammons said it was his belief, however, based on current feeling, that there would be no crisis of any nature develop to impede the growth of the stoker industry in the next few years.

At the general session on June 2, Julius K. Luthe, president, Perfex Corporation, said that the market for automatic home and building-heating equipment with all types of fuel is "very much undersold." Builders of new homes, he added, are beginning to show a marked preference for complete heating units. Covering the progress in the control-manufacturing business during the last few years, Mr. Luthe stated that the rapidly growing trend in the stoker industry is for the manufacturer to sell his stoker only as a complete appliance equipped with controls and other accessories, using his own individual name.

A. R. Stock, sales manager, Sinclair Coal Co., Kansas City, Mo., discussed sound

films and their adaptation to stoker selling and followed this with a showing of the Sinclair company's stoker-coal film. This film is considered one of the most important developments in recent years and the association executives are undertaking a study of sound films with the idea of producing several films for national distribution to aid dealers and distributors of both coal and stokers.

H. J. Spear, assistant general sales manager, Koppers Coal Co., Pittsburgh, Pa., stated that the producers of smokeless stoker coal had benefited definitely from the growth of automatic heating stoker sales in the last several years. He offered a number of suggestions for furthering co-operation between the stoker and coal industries. Paul Weir, consulting engineer, discussed the technical aspects of coal preparation in Midwestern fields.

Industrial research and promotion are "insurance capital," declared Clyde E. Williams, director of Battelle Memorial Institute, Columbus, Ohio. He said that stoker manufacturers, in order to maintain their position and to make as much progress in the future as in the past, must invest in research and experimental promotion work. All industries pass through two stages: one of development of technical features and method of marketing; and the second of active sales, which should be a period of stability and profits.

The annual banquet was addressed by Barton R. Gebhart, vice-president, Chicago, Wilmington & Franklin Coal Co. Reviewing the history of the stoker in the last ten years, the speaker remarked: "You have dotted the country with stoker-manufacturing plants, creating new employment and payrolls. You have successfully tackled the American mass market. You have brought the most revolutionary change to domestic heating in the history of solid fuel, and you've shaken the coal industry out of a long nightmare and

forced changes in coal preparation so radical they were not dreamed of ten years ago. The coal industry is your partner. The stoker-equipped plant gives coal a much more stable outlet than the hand-fired plant and an outlet that can be served with economy to the user and profit to the producer and retailer of coal.

"Of recent years the coal industry, thoroughly awakened, has done yeoman service in the promotion of the cause of stokers. The campaigns of the National Coal Association in behalf of bituminous coal, and of Anthracite Industries, Inc., are not just educating the widespread and numerous groups in the coal industry itself but are forging the most important link of all in the chain by carrying the message of automatic heat with coal to the actual consumers of fuel. Through Bituminous Coal Research, Inc., and through the Anthracite Industries Laboratory we have begun to contribute, as we should, of the fruits of scientific research. In many of our technical colleges and universities, and in the laboratories of coal producers, researches in coal are developing improvements in the technique of coal preparation which mean better satisfaction to the users of the machines you sell."

E. C. Sammons, vice-president, Iron Fireman Mfg. Co., Portland, Ore., was reelected president; Frank Hoke, vice-president, Holcomb & Hoke Mfg. Co., Indianapolis, Ind., was again chosen vice-president, and G. Walter Ostrand, general manager, Caldwell Moore plant, Link-Belt Co., Chicago, was renamed treasurer. These officers also were reelected to the board of directors together with Robert H. Morse, Jr., manager, stoker division, Fairbanks, Morse & Co., Chicago; and Ray C. Goddard, vice-president, Steel Products Engineering Co., Springfield, Ohio. Marc G. Bluth was reappointed executive secretary.

Three new members were accepted: Peerless Mfg. Co., Louisville, Ky.; Conco-Sampsel Stoker Corporation, Mendota, Ill., and McDonnell-Miller, Chicago.

Stripping Merger Approved

Stockholders of the Electric Shovel Coal Corporation adopted the recommendation of the management to consolidate with the Patoka Coal Co. on June 15. The plan had already been approved by stockholders of the latter company. Both companies operate strip mines in Indiana.

Mining Machine Co. Head Dies

Charles H. Strawbridge, 66, president of the Goodman Mfg. Co., died May 15 at his home in Chicago after a brief illness. He had been associated with the company 39 years, having been appointed secretary in 1900. In 1906 he also became treasurer, and in 1913 a director. He was elected vice-president in 1918, in which capacity he served until he became president in 1923. His administrative duties included the guidance of the company's trade relations to the industry, and his broad and comprehensive understanding won recognition for his contributions to the various trade groups of which he was a member.

He served on the executive committee

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of the National Metal Trades Association for several years, becoming president in 1936; he also was a member of the Electrical Manufacturers' Club and held various offices in the National Electrical Manufacturers' Association. At the time of his death he was a director of the Illinois Manufacturers' Association and a trustee of Armour Institute of Technology; and had been a director of the Union Special Machine Co., Columbian Bank Note Co., and Superior Steel & Malleable Castings Co.

Mining Institute Leaders For Next Year

Officers nominated for the Coal Committee of the American Institute of Mining and Metallurgical Engineers are C. E. Lawall, acting president, West Virginia University, Morgantown, W. Va., chairman; J. E. Tobey, manager, engineering department, Appalachian Coals, Inc., Cincinnati, Ohio, vice-chairman; D. D. Dodge, general superintendent, Woodward Iron Co., Birmingham, Ala.; C. T. Hayden, general manager, Sahara Coal Co., Chicago; and J. L. G. Weysser, research mining engineer, Lehigh Navigation Coal Co., Lansford, Pa., executive committeemen.

Named for the institute, as a whole, are H. G. Moulton, consulting mining engineer, New York, president and director; E. V. Daveler, vice-president and treasurer, Nevada Consolidated Copper Corporation, New York, and W. M. Peirce, assistant to chief of research, New Jersey Zinc Co., Palmerton, Pa., vice-presidents and directors; H. J. Brown, consulting engineer, West Newton, Mass.; Karl Eilers, Sea Cliff, N. Y.; J. M. Boutwell, consulting mining geologist, Salt Lake City, Utah; H. S. Mudd, Los Angeles, Calif., and F. A. Wardlaw, Jr., mining engineer, assistant general manager, Inspiration Consolidated Copper Co., Inspiration, Ariz., directors, and F. E. Wormser, secretary and treasurer, Lead Industries Association, New York, director-at-large.

All these are nominated, but the nominations, though reported at the meeting of the board of directors of June 15, did not receive approval, awaiting the receipt of nominations for other divisions. However, judging by earlier precedents, approval and election practically are assured.

Completing the Record

Pumping equipment is a necessary adjunct to the Hydrotator cleaning units employed for all sizes smaller than nut in the new Trevorton breaker described in the June *Coal Age*, p. 48. In this connection, the Allen-Sherman-Hoff Co. calls attention to the fact that the Hydrotator handling rice coal is equipped with a Hydroseal pump. All other pumps, as stated in the article, were supplied by Barrett, Haentjens & Co.

Coal Company Office Moved

The principal office of the Sycamore Coal Corporation, of which C. A. Hamill is president, has been changed from Grundy to Patterson, Va.

Harlan Operators Permitted To Contract Individually

The Harlan County (Ky.) Coal Operators' Association ended its united front on June 15, when permission was granted to its 21 member companies to contract individually, if they chose, with the United Mine Workers. George Titler, secretary-treasurer of the Harlan U.M.W. district organization, said the companies had been invited to negotiate separate contracts, following announcement by George S. Ward, secretary of the operators' association, that its unit negotiating policy had been suspended, leaving members free to act independently.

The stumbling block to unit agreement on a new contract based on the Appalachian two-year pact signed in mid-May was the association's opposition to the closed-shop principle.

The Creech Coal Co. has signed a "union shop" contract with the United Mine Workers—the first member of the Harlan County Coal Operators' Association to do so—according to William Turnblazer, Harlan (Kentucky) district U.M.W. president. He said that the company put 350 men back to work on June 21.



Woodward Signs With Union

The Woodward Iron Co., Woodward, Ala., signed an agreement June 19 with the United Mine Workers providing for reopening on June 21 of the company's coal mines. With about a thousand miners affected by the new pact, it ends the coal-mining holiday in Alabama. Most of the other mines are active again, agreements with major companies having been reached.



Industrial Notes

WALLACE E. KIRK Co., Pittsburgh, Pa., announces that J. G. Pollock, formerly superintendent of electrical and mechanical equipment with the Jamison Coal & Coke Co., Greenburg, Pa., has joined the former company as associate engineer. Mr. Pollock was with the Jamison company for twenty years.

LINK-BELT Co. has appointed the Klinger-Dills Co., Dayton, Ohio, and the Kenny Machinery & Tractor Co., Kansas City, Mo., as agents for its shovels, draglines and cranes. Link-Belt also has been appointed distributor for friction clutches and clutch couplings of the Twin Disc Clutch Co., Racine, Wis.

MINE SAFETY APPLIANCES Co. has named Clark Walker as its representative in the Fairmont (W. Va.) district, where he will work in cooperation with H. R. Johnson, Uniontown (Pa.) district manager.

JOHN A. ROEBLING'S SONS Co. has made Earl N. Graf manager of its Pittsburgh (Pa.) branch.

WESTINGHOUSE ELECTRIC & MFG. Co. has appointed Robert A. Neal as manager of its switchgear division. He has been with the company since 1910, lately as assistant to the vice-president.

NORMA-HOFFMANN BEARINGS CORPORATION has elected the following officers: W.

P-G STEEL GRID RESISTORS BUILT FOR MINING MACHINES

Will mount in your present space—Constructed entirely of Steel and Mica there is nothing to break—Ninety days free trial to convince you—Guaranteed for twelve months Trouble Free Service—Truly



"The RESISTOR you can INSTALL and FORGET"

90 DAYS
FREE TRIAL



THE POST-GLOVER ELECTRIC CO.

ESTABLISHED 1892

221 WEST THIRD STREET, CINCINNATI, OHIO

PLAT-O COAL PREPARATION MACHINERY

The new Deister Plat-O Coal Washing Table for cleaning sizes from 14" to dust.

Write for bulletin 16B.

Deister Plat-O Vibrating Screen for the accurate sizing of coarse and medium size coal.

Write for bulletin 26.

Deister Multirap Vibrator for screening the finer sizes of coal.

Write for Bulletin 24.

DEISTER MACHINE COMPANY

1933 E. Wayne St.,
FORT WAYNE, INDIANA

GET THE HOOK that you can bet your life on



LAUGHLIN DROP FORGED HOOKS

There's no substitute for drop forging. Safety and long run economy demand that you use LAUGHLIN trustworthy wire rope and chain fittings, drop forged and finished by a 70 year old company in a new plant with the latest precision equipment.

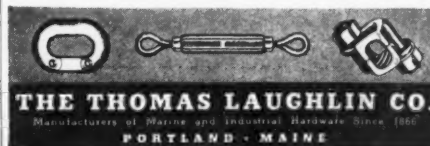
Recently developed electrical devices automatically control temperatures in our heat treating department insuring fittings that match today's stronger wire rope and chain.

You can quickly obtain through your industrial distributor LAUGHLIN Drop Forged Steel HOIST HOOKS, Grab Hooks, (with extra large eye) Safety Hooks, Missing Links (oval and pear shaped), Turnbuckles, Eye Bolts, Shackles, Thimbles, Swivels, Sockets and Clips.

Send for complete Catalog and sample of the new LAUGHLIN "Safety" Wire Rope Clip, which marks a great advance in clip design.



DIRIGO SAFETY HOOK. The bronze tongue provides extra safety. Ample room left for heavy attachments to pass. Sizes for throat opening 1/2" to 2".



THE THOMAS LAUGHLIN CO.
Manufacturers of Marine and Industrial Hardware Since 1865
PORTLAND - MAINE

M. Nones, chairman of the board; O. P. Wilson, president and treasurer; H. J. Ritter, vice-president and secretary; C. B. Malone, vice-president in charge of plant operations.

HEWITT RUBBER CORPORATION has expanded its Dallas (Texas) warehouse facilities by the addition of 2,500 sq.ft. of floor space.

CUTLER-HAMMER, INC., has appointed G. S. Crane vice-president in charge of sales and engineering. Already in charge of the sales division of the company, with which he has been associated for 29 years, Mr. Crane now also assumes supervision of all development work, with executive control of the engineering, drafting and patent departments.

TIMKEN ROLLER BEARING CO. has appointed W. Robert Timken as assistant to the president. He has served in various capacities throughout the company's plant since his graduation from Harvard in 1933.

LINDE AIR PRODUCTS CO., CARBIDE & CHEMICALS CORPORATION and HAYNES STELLITE CO., all of which are units of Union Carbon & Carbide Corporation, have new Cleveland (Ohio) district offices at 1517 Superior Ave. District managers are: H. H. Dyar, Linde Air Products Co.; E. E. Fogle, Carbide & Chemicals Corporation, and F. P. Shephard, Haynes Stellite Co.

GREGORY ELECTRIC CO. has moved to new quarters at 2630 South Wabash Ave., Chicago.

Permissible Plates Issued

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Jeffrey Mfg. Co.: Type 35-BC-S shortwall mining machine; 35-hp. motor, 250 and 500 volts, d.c.; Approvals 371 and 371A; May 5.

Jeffrey Mfg. Co.: Type 29-U track-mounted mining machine (re-designed model); 50- and 18-hp motors, 250 and 500 volts, d.c.; Approvals 372 and 372A; May 10.

John H. McGowan Co.: McGowan mine pump; 5-hp. motor, 230 volts, d.c.; Approval 373; May 17.

Justrite Mfg. Co.: Justrite electric lantern; Approval 1017; May 26.

"Hallway" Saves \$135,000

Rather than pay \$160,000 for right-of-way privileges to haul its coal across land at Jones Fork, near Tazewell, Va., the Jewell Ridge Coal Corporation is digging a tunnel two miles long for the purpose. Corporation officials said the "hallway" would cost about \$25,000.

Dr. Huston St. Clair, vice-president, explained that coal rights-of-way to the property were acquired by his company, but that nothing was said of transporting across the land coal mined from the company's other properties. As a result, four property owners asked \$40,000 each for the use of their land.

Mine With Perfect Record Wins Safety Trophy

One bituminous-coal mine with a perfect record and one anthracite colliery that made a notable achievement for safety in 1938 were awarded "Sentinels of Safety" trophies, donated by the *Explosives Engineer*, on May 27. The winners were announced by Dr. John W. Finch, Director, U. S. Bureau of Mines.

In the bituminous-coal group, the trophy was awarded to the "B" mine of the Union Pacific Coal Co., Superior, Wyo. During 1938 it worked 243,094 man-hours without a lost-time accident. This record was made by 189 employees working 246 days.

The trophy for anthracite mines was won by the Greenough mine, Colonial Colliery Co., Natalie, Pa. During a period of 223 days last year, the mine worked 319,035 man-hours with eleven lost-time accidents causing 285 days of disability.

Certificates of honorable mention were given to the following mines: bituminous—D. O. Clark mine, Union Pacific Coal Co., Superior, Wyo.; Rockhill No. 7 mine, Rockhill Coal & Iron Co., Robertsdale, Pa.; Samoset mine, Alabama By-Products Corporation, Dora, Ala.; Hanna No. 4 mine, Union Pacific Coal Co., Hanna, Wyo. Anthracite—Eddy Creek (Birds-eye) mine and Eddy Creek (Shaft) mine, Hudson Coal Co., Lackawanna County, Pennsylvania; Jeddo No. 7 mine, Jeddo-Highland Coal Co., Harleigh, Pa.; Mid-valley mine, Hazle Brook Coal Co., Wilburton, Pa.

Coal Research Bill Moves Up

An appropriation of \$300,000 for development of a smokeless Illinois coal was approved on June 15 by the House at Springfield. The Johnson measure (*Coal Age*, May, p. 72), which would finance a two-year experimental program for producing smokeless fuel on a commercial scale, was sent to the Senate with little opposition. It contains an item of \$95,000 for construction of a research laboratory at the University of Illinois for use of the State Geological Survey in the research work. The vote was 84 to 21.

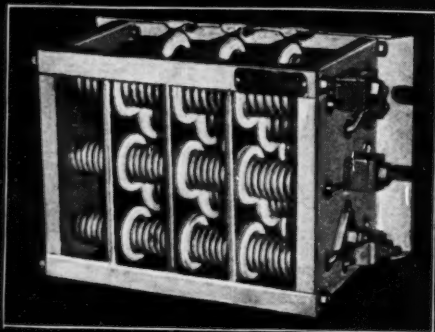
Plan Research for Ohio Coal

Representative Lewis of Ohio has introduced a bill (H. R. 6691) in the House at Washington providing for an initial appropriation of \$200,000 and \$60,000 annually for the maintenance and operation of a research laboratory in the bituminous coal region of Ohio. The work to be carried on would deal with investigations relating to the mining, preparation and utilization of coal, with specific reference to efficiency, development of new uses, and the extension of markets.

Stoker Added to Approved List

Seal of approval was awarded June 1 by Anthracite Industries, Inc., to the Coal-O-Matic Stoker, manufactured by the Coal-O-Matic Stoker Co., Wyoming, Pa. The award followed rigid tests at the laboratory and field surveys con-

RESISTANCE THAT STANDS THE GAFF



FOR
MINING MACHINES
MINE LOCOMOTIVES

FOR
SLIP RING
MOTORS

GUYAN MACHINERY COMPANY

LOGAN, WEST VIRGINIA

ducted by laboratory engineers. Made in both hopper and bin-feed types, the present model is the result of four years of development work, although field surveys indicated that practically all of the original units installed four years ago are still in active service.

Keystone Men Tops in Safety

First-aid teams representing the Keystone mine won five of the six men's prizes at a divisional safety meet sponsored by the Koppers Coal Co., held June 10 at Carswell, W. Va. Twenty-two teams, including six Boy Scout groups, competed for prizes aggregating \$300 in value; the Keystone, Carswell and Maitland mines of the Houston division were represented. In the contest for white men's teams, Keystone No. 18 was first with 99.85 + per cent; second, Keystone No. 19, 99.85; third, Keystone No. 17, 99.70. Colored men's teams finished in this order: first, Carswell No. 5, 98.65; second, Keystone No. 3, 98; third, Keystone No. 2, 97.85.

New River Buys Price Hill

Coal property of the Price Hill Colliery Co., in Fayette County, West Virginia, has been acquired at a special commissioner's sale by the New River Co., Mount Hope, W. Va. Priority was given by the Circuit Court to the tax claims of the Federal and State governments over other creditors.

Trade Literature

CHAINS AND ATTACHMENTS—Moline Malleable Iron Co., St. Charles, Ill. Catalog gives complete listings and prices of combination chains and chain attachments, sprocket wheels, elevator buckets and flight conveyors. Description, capacities, weights, etc., are included.

CLAMSHELL BUCKETS—Hayward Co., New York City. Bulletin 696 contains information on buckets for rehandling light and heavy materials which can be used on all types of operating machines.

CONVERSION TABLES—International Nickel Co., New York City. Celluloid card gives hardness conversion data as well as S.A.E. standard specifications for nickel-alloy steels.

CRUSHER—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin No. 1469-E illustrates and describes the construction and ease of feeding the Newhouse high-capacity reduction crusher, an electric direct-driven unit arranged for either center or spout discharge. It contains cross-sectional views, including the oiling system; also installation views as well as dimensions and capacity tables.

DIESEL TRACTOR—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 5330 details outstanding mechanical features of the D7 unit, illustrating its versatility with action pictures. Cutaway halftones trace the path of fuel from storage tank to cylinder, and detailed pictures show the construction of injection valves, injection pumps, crank-case, cylinder heads, pistons, etc. Types of materials, heat-

treatment, and specifications of various parts are noted.

EARTH MOVING—R. G. LeTourneau, Inc., Peoria, Ill. Another bi-monthly publication, the Co-Operator, for certified LeTourneau operators, to help teach them to do more effective and profitable work, has been issued by this company.

ELECTRICAL MAINTENANCE EQUIPMENT—Ideal Commutator Dresser Co., Sycamore, Ill. Catalog No. J-239 brings up to date the company's file on motor and other maintenance equipment and electrical specialties. New products added to the Ideal line during the last year are included, as well as hints on commutator care, operation of d.c. generators, definitions of electrical terms, and useful engineering tables.

EVAPORATING COOLERS—Worthington Pump & Machinery Corporation, Harrison, N. J. Folder S-500-B37 details features and specifications of units for engine jacket water to be used with stationary type diesel and gas engines. Capacity ratings are included.

MATERIALS HANDLING—Link-Belt Co., Chicago. Catalog 800 (1278 pp.) contains list prices, dimensions, weights and engineering data on power transmission machinery and on equipment for handling, screening, drying, cooling and preparing materials mechanically. Book No. 1600, on modern power transmission units, contains complete design and application data, dimensions, weights, list prices, cross-indexed for convenient use of design engineers and plant managers.

POWER CABLE—Anaconda Wire & Cable Co., New York City. Publication No. C-42 gives description, applications, physical and electrical properties of rubber power cables, including much technical data.

REPAIR CEMENT—Smooth-On Mfg. Co., Jersey City, N. J. Forty-page booklet describes Smooth-On products for repair and construction purposes, with 170 diagrams showing how to use them.

STAINLESS ELECTRODES—McKay Co., Pittsburgh, Pa. Sixteen-page booklet is devoted to complete line of stainless steel electrodes covering all chemical analyses. The certification process of weld-deposit analysis and welding procedure for the various stainless steels is described.

WATER CONDITIONING—Elgin Softener Corporation, Elgin, Ill. Bulletin discusses four types of zeolite water softeners and their operating principles; also iron and manganese removal, aeration, and boiler-water conditioning systems—external and internal types.

Mine Accident Fatality Rate Dips With Lower Output

Accidents at coal mines in the United States caused the deaths of 24 bituminous and 21 anthracite miners in April last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 10,747,000 tons, the death rate among bituminous miners was 2.23 per million tons, compared with 4.29 in the corresponding month of last year.

The anthracite fatality rate in April last was 4.02 based on an output of 5,227,000 tons, as against 7.65 in April, 1938.

For the two industries combined, the death rate in April last was 2.82, compared with 4.72 in the fourth month a year ago.

Fatalities during April last, by causes and States, as well as comparable rates for the first four months of 1938 and 1939, are shown below:

UNITED STATES COAL-MINE FATALITIES IN APRIL 1939, BY CAUSES AND STATES

State	Underground							Open-cut and Surface				
	Falls of roof	Falls of face	Haulage	Explosives	Electricity	Other causes	Total underground	Objects falling down shafts	Mine cars	Falls of persons	Other causes	Total surface
Colorado.....	1	..	..	..	..	..	1	..	..	..	..	1
Illinois.....	3	..	3	..	..	..	6	..	..	..	..	6
Indiana.....	1	..	1	..	..	..	2	..	..	..	..	2
Kentucky.....	1	..	2	1	1	1	6	1	..	..	..	7
Ohio.....	2	..	..	..	..	..	2	..	1	..	..	3
Pennsylvania (bit.).....	1	..	..	..	..	..	1	..	..	..	..	1
Utah.....	..	..	1	..	..	..	1	..	..	..	..	1
Virginia.....	1	..	..	..	..	..	1	..	..	..	..	1
West Virginia.....	2	..	..	..	..	..	2	..	..	..	..	2
Total (bituminous).....	12	..	7	1	1	1	22	1	1	..	..	24
Pennsylvania (anthracite).....	9	5	4	..	..	1	19	..	..	1	1	21
Grand total.....	21	5	11	1	1	2	41	1	1	1	1	45

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

Cause	January-April, 1938 and 1939				Anthracite				Total			
	Number Killed 1938	Number Killed 1939	Killed per Million Tons 1938	Killed per Million Tons 1939	Number Killed 1938	Number Killed 1939	Killed per Million Tons 1938	Killed per Million Tons 1939	Number Killed 1938	Number Killed 1939	Killed per Million Tons 1938	Killed per Million Tons 1939
Underground:												
Falls of roof and Coal....	147	130	1.376	1.126	58	48	3.740	2.682	205	178	1.676	1.335
Haulage.....	50	42	.468	.364	10	7	.645	.391	60	49	.491	.367
Gas or dust explosions:												
Local.....	9	2	.084	.017	1	..	.064	..	10	2	.082	.015
Major.....	60	..	.562	..	8	..	.516	..	68	..	.556	..
Explosives.....	5	5	.047	.043	4	8	.258	.447	9	13	.074	.097
Electricity.....	13	14	.122	.121	..	1	..	.056	13	15	.106	.112
Machinery.....	9	6	.084	.052	..	..	..	..	9	6	.074	.045
Shaft.....	2	2	.017	.017	1	2	.064	.112	3	4	.024	.030
Miscellaneous.....	5	4	.047	.035	3	5	.194	.279	8	9	.065	.068
Stripping or open-cut.....	1	2	.009	.017	8	2	.516	.112	9	4	.074	.030
Surface.....	15	7	.141	.061	2	5	.129	.279	17	12	.139	.090
Total.....	316	214	2.959	1.853	95	78	6.126	4.358	411	292	3.361	2.189

*All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

NEW FEATURE ADDED TO NO-BLIND SCREEN

Deister Concentrator Co., Fort Wayne, Ind., has developed and incorporated a new feature, known as the Tri-Vibe panel, in the Leahy heavy-duty NO-Blind vibrating screens. According to the manufacturer, the new feature, made of three vibrating beams tied together by coupler bars along the sides, regenerates in the screen jacket the positive vibration set up by the Leahy vibrator, by triple delivery under controlled transmission and distribution. Full surface vibration, it is said, is readily assured by the new construction, which permits easier adjustment of screen-jacket tensioning, more positive vibration over the full screen jacket, and increased life of screen cloth.

BLASTING AGENT

A new blasting agent, "Nitramon" S, for seismic prospecting by the reflection method, is being marketed by E. I. DuPont de Nemours & Co., Wilmington, Del. Packed in metal cans with ends which permit joining of a number of separate units before loading in the blast or shot holes, it is, according to the maker, much safer to handle and use than gelatin dynamites generally used for reflection shooting. It is not an explosive in the accepted sense, since it cannot be detonated by the strongest commercial detonators, by Cordau or Primacord detonating fuse, by flame or by heavy blows.

The new blasting agent is non-freezing under any temperatures and usually will be more economical to use than the gelatin dynamites. Its velocity and strength are approximately equal to those of gelatins normally employed in geophysical prospecting. "Nitramon" S is packed in two sizes: 2-in. diameter x 1 lb. and 2-in. diameter x 1½ lb. The former is 6½ in. long; the latter, 6¼ in. Both size cans

are packed in cases of 50 lb. net weight.

Special primers, also packed in cans, must be used with each charge to initiate "Nitramon" S assembly. They are prepared for use by removing a protective shield, inserting an electric blasting cap in a well provided in the can, anchoring the leg wires, and replacing the protective shield.

LIMIT SWITCH

Designed for use on machine tools, conveyors and other automatic equipment, a small snap-action limit switch (CR 9440-D2) brought out by General Electric Co., Schenectady, N. Y., is so constructed that it can easily be mounted for operation in practically any position. This device was developed to meet a need among machine designers and users for a limit switch that would not only be small in size but which would also operate slowly without contact burning and be proof against oil and dirt around a machine. It is enclosed in a strong die-cast case, drilled to facilitate mounting on either back or side. Silver-to-silver double-break contacts



assure long life, it is said, while two independent circuits provide any contact arrangement. Positive snap-action is obtained by means of an over-center toggle mechanism. The switch can be supplied with either a roller-lever or pushrod head. A gasketed cover and grease seals on the pushrod and shaft make it oilproof. Ample space inside the enclosure, as well as accessible terminals, permit rapid and simple installation.

BURSTPROOF STEAM HOSE

A new burstproof steam hose has been introduced by the B. F. Goodrich Co., Akron, Ohio, which is said to make for prolonged life in this severe service. Tube of the hose is made from a compound possessing great heat- and steam-resisting properties. On sizes 1½ in. and larger, one ply of strong asbestos woven fabric and a spiral wire reinforcement are placed between the wire braids. On sizes 1 in. and under, a braided asbestos fabric is used. Available in sizes from ¾ and 2½ in., the new product is recommended for saturated steam pressures up to 200 lb. per square inch or superheated steam up to 390 deg. F.

MACHINING ALLOY

A new hard-carbide alloy for machining tough metals such as steel, heat-treated up to 500 Brinell, which combines roughing and finishing in one operation, is now being supplied under the trade name "Kennametal" by the McKenna Metals Co., Latrobe, Pa. The basic ingredient is tungsten-titanium carbide (WTiC2) and the new alloy may be used also in machining Monel metal, malleable iron, cast iron, brass, bronze, aluminum, etc.

It is available in three standard styles of blanks from which tools may be tipped by the user, or it may be had in other than standard blanks.

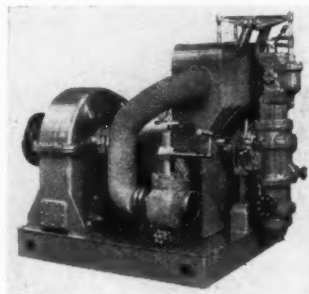
The manufacturer asserts that the new alloy permits two to six times greater cutting speeds than those of high-speed steel and ten to fifty times as many pieces per grind of tool.

INTER-OFFICE PHONE

The Telfair Telfone Corporation, West Orange, N. J., has introduced a new simplified office communication unit requiring no maintenance. Voice-powered and non-magnetic, the Telfair Telfone, according to the maker, permits elimination of many of the costly and intricate parts, devices, magnets, accessories and power sources of the usual telephone to a degree where simplicity makes it of great dependability and economy. It comes equipped for fully selective communication with selector dials and without dials for party-line or two-station use.

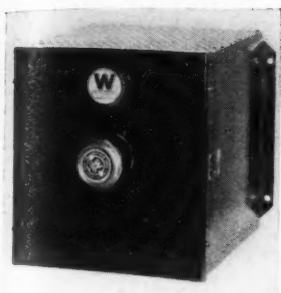
TURBINES, RHEOSTATS, LINESTARTERS

Improved multi-stage steam turbines for general-purpose drives have been developed by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. They range from 100 to 1,000 hp., 100 to 5,500 r.p.m. and are particularly suitable for driving fans, pumps, compressors, pul-



verizers and other machinery in process. Modifications of one basic design, says the manufacturer, provide for condensing, condensing extraction, non-condensing extraction or mixed-pressure service. Type "M" can be supplied for pressures up to 650 lb., steam temperatures to 750 deg. F., exhaust pressures to 200 lb., vacuum to 29 in., and extraction pressures to 200 lb.

A new series of heavy-duty field rheostats, designed for adjusting speed of motors in severe industrial service, is presented by Westinghouse. Designated as Type JM, this unit consists of a faceplate with contact arm and resistors of the tube type assembled as a unit in a frame. The faceplate provides 60-point speed control. Vitreous-enamel-pro-

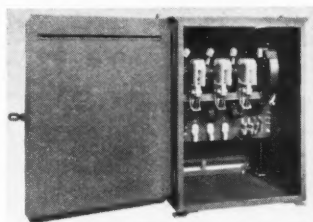


tested "Ribflex" and "Vitrohm" resistor tubes are assembled in a frame of insulated tierods attached to the faceplate. Individual tubes may be easily removed and replaced, either for repair or to change the characteristics of the rheostat. This entire assembly is mounted on a wall-mounting sheet-metal inclosure with four bolts, so that the entire unit may be removed without disturbing any wiring or conduit. The inclosing box has a perforated metal top and bottom for maximum ventilation and contains a knockout for $\frac{3}{4}$ - or 1-in. conduit in the bottom near the back. The front cover is removable. A $3\frac{1}{2}$ -in. molded composition handwheel is mounted on the rheostat shaft. For remote operation a 5-in. sprocket for chain operation may be supplied.

A new De-ion combination consisting of a magnetically operated linestarter and a manually operated motor circuit switch combined in the same streamlined cabinet is offered by Westinghouse. It is especially designed, according to the manufacturer, for across-the-line starting of squirrel-cage motors or as primary switch for wound-rotor induction motors. With the insertion of one padlock the unit can be locked in "off" position and the door locked shut; to make it more safe, the door cannot be opened with the switch in "on" position. The starter, says the maker, has fuseless circuit protection by

an instantaneous magnetic trip circuit breaker; there are no elements to renew after circuit tripping. Breaker is reset by moving external handle; the breaker handle is a positive indicator, showing whether breaker is "on," "off" or "tripped."

New non-reversing linestarters finding their chief application in across-the-line starting of large squirrel-cage motors and as primary switches for wound-rotor induction motors are another offering by Westinghouse. Typical applications include pumps, compressors, fans and blowers, or any application requiring pushbutton or



remote control where across-the-line starting is permissible. Features stressed by the maker include low-voltage protection or release through low-voltage relay, bimetal type of overload relay, hand or automatic reset, saturated current transformers insuring adequate protection on slow-starting applications, strong magnetic blowouts insuring adequate arc-rupturing capacity.

STRONG FOLDING RULE

To meet the common complaint that folding rules break easily, the Lufkin Rule Co., Saginaw, Mich., has placed on the market its Rugged Rule. It has tough hardwood sections $\frac{1}{4}$ in. thick to make it not only durable but rigid. The spring joints are brass-plated and have patented locks to maintain accuracy. It also has brass strike plates to prevent wear of sections in opening and closing. The 6-in. hardwood sections have a uniform light boxwood color so that the black markings are easy to read.

DUPLEX WELDING HOSE

Condor duplex welding hose, developed by the Manhattan Rubber Mfg. Division, Passaic, N. J., is designed to make welding safer and more efficient than is possible with separate oxygen and acetylene lines. In its construction, says the manufacturer, two hose lines are held together by a permanent web joint, integrally molded and having great strength and flexibility. The joint prevents tangling, kink-

ing and snagging while the hose is in use. The ends are separated 18 in. for the torch end and 24 in. for the tank end for ease in making connections and in handling.

The hose may be obtained in either one- or two-braid, or in heavy-duty braid and spiral-cord construction, depending upon the working pressures used. Construction features stressed by the maker are strong inner tubes that are smooth and non-porous, and tough flexible covers having maximum resistance to abrasion and aging. Covers are furnished corrugated and are colored red and green to distinguish the oxygen from the acetylene line.

CABLE CONTROL; TRACTOR

To facilitate the handling of cable-controlled scrapers, bulldozers and other equipment, Caterpillar Tractor Co., Peoria, Ill., has introduced a cable-control attachment. Features of these double-drum, rear-mounted units stressed by the maker are: Control drums easily threaded without making sharp bends in cable; yokes and through-bolts provide frame around working parts, assuring perfect alignment of parts and rigid support; clutch adjustment nut readily accessible for quick, easy adjustment; only link pin and yoke need be removed to slip out clutch; position of levers adjustable to fit operator; three widely spaced points of attachment provide rigid connection to tractor; eyebolt, located at center of balance, facilitates removing control unit from tractor.

Caterpillar also announces a new 25-hp. tractor, the R2, with either gasoline or tractor-fuel engine and five-speed transmission. Designed to provide the correct working speed for various jobs, the unit has wide application.

AUTOMATIC PUMP CONTROL

Worthington Pump & Machinery Corporation, Harrison, N. J., has developed a synchronized unloading and loading device for automatic delivery control of high-pressure reciprocating pumps. Suction-valve-controlled, air-actuated, the new mechanism, says the manufacturer, guarantees a quick but gradual decelerating fluid delivery from full flow to zero, and vice versa. The time required for fully unloading or loading any type of multiple-plunger reciprocating pump does not exceed one-half of one revolution of the pump. The maker states that the device provides positive synchro-

nization of action in loading and unloading, regardless of the point in the pump revolution at which the control functions. The individual cylinders load and unload in sequence on the suction stroke, the action starting with any cylinder, with consequent elimination of shock.

INDICATING GAGE

Designed for use where endurance as well as accuracy is a prime factor, an indicating gage—Model P—with an all-welded steel construction has been introduced by the Foxboro Co., Foxboro, Mass. Its all-ferrous construction affords protection on applications where there are fumes or vapors corrosive to bronze; the absence of solder and bronze eliminates risk of fire hazard.

A special Chapmanized steel of high Brinell rating is employed in the pinion, segment, arbor and connecting link. To eliminate binding or raggedness in pointer motion and to insure a smoothly operating movement, the segments and pinions are not blanked in but

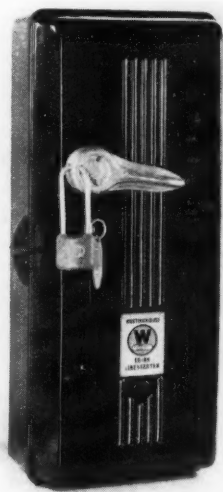


have milled teeth. The movement plates, columns, links, shoulder screws, pointers and dials are made of stainless steel. Threaded rings, equipped with gaskets, make it moisture-proof and vaporproof and also serve to retain the extra-heavy glass firmly in place.

WELDING HELMETS, HAND SHIELDS

Four new welding helmets and an equal number of hand shields have been brought out by the American Optical Co., Southbridge, Mass. All these new units, says the manufacturer, are made of high-grade vulcanized fiber, in either fabricated or one-piece construction, and are designed for safety, comfort, convenience and durability. The helmets have a new free-floating headgear and an outside friction joint as standard equipment.

Three types of glass holders are available: deep-drawn leak-proof steel, improved Bakelite,



and the new Dowmetal lift front, all of which are said to assure maximum protection for welding plates and cover glass. A feature is that they hold the welding and cover glass in position flexibly—not rigidly—in order to cushion the shock if accidentally struck. Glass can be changed without smudging or risk of breaking.

Three new face shields also are offered by the company. Although not designed to replace goggle protection, they are said to be suitable for light-duty work; being compact and light in weight, they are comfortable under all conditions. They may be thrown up when not in use, and the friction joint (between shield and head-band) holds it firmly in place in either the "on guard" or "off" position. They may be worn with or without prescription glasses and are supplied in clear, amber or green windows.

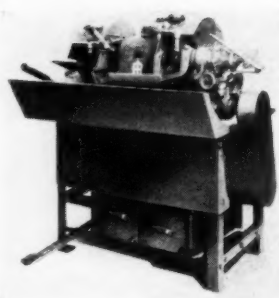
PORTABLE COMPRESSOR, JACKBIT GRINDER

A new line of two-stage air-cooled portable compressors incorporating a number of improvements has been introduced by Ingersoll-Rand Co., Phillipsburg, N. J. Available in five sizes for actual capacities of 85, 105, 160, 210 and 315 c.f.m. of air at 100 lb. pressure, they are powered either by Waukesha heavy-duty industrial-type gasoline engines or Ingersoll-Rand Type H oil engines. Streamlining of the complete unit, with low center of gravity, smooth lines and finish, says the manufacturer, results in a practical unit of modern



appearance. A bell housing is used on all sizes, making compressor and engine practically one unit. The entire assembly is mounted on a sturdy pressed-steel frame. The air intake is now on top, and a stronger, sectionalized radiator having improved construction of sections and more rigid mounting is furnished.

Thermostatic control replaces the adjustable curtain and automatically assures the correct water-cooling temperature for the engine. A more convenient location is provided for the air receiver and fuel tank, the latter being lead-coated, easy to fill and sufficiently large to hold a day's



supply. The compressor is an air-cooled two-stage machine. The use of two-stage pressure cylinders for each high-pressure cylinder provides 25 per cent greater radiating capacity, thus insuring uniformly low operating temperatures. The new models also have patented I-R channel valves, which are said to insure efficient, quiet and cool operation.

A new semi-automatic high-production jackbit grinder also is announced by Ingersoll-Rand. Known as the size J-1 this one-man machine, according to the maker, produces 60 average hard bits or 100 average annealed bits per hour. Gaging is done automatically while the operative is forming the face of the bit. The machine is adaptable for use with all types of standard detachable rock-drill bits and is said to be particularly suitable for use in mines.

LIGHT COMPRESSORS

Sullivan Machinery Co., Michigan City, Ind., announces a completely new line of light-weight portable air compressors under the trade name "Zeph-Air." The new line features, it is stated, compact construction, self starters and other refinements for extreme mobility and ease of operation. Two sizes are available with capacities of 60 and 85 c.f.m. Although these compressors will operate concrete breakers and rock drills, the company points out that they are so small and compact that the two-wheeled mountings can be towed by a pleasure car and the skid units can be installed in the body of a standard pick-up truck.

VOICE-POWERED PHONE

A new telephone instrument—the 11A Magnetic—which gets its power solely from the speaker's voice and enables the user to call any of five other stations has been announced by the Western Electric Co., New York. Its electrical voice current is generated internally by the impact of sound waves on a special diaphragm, making it

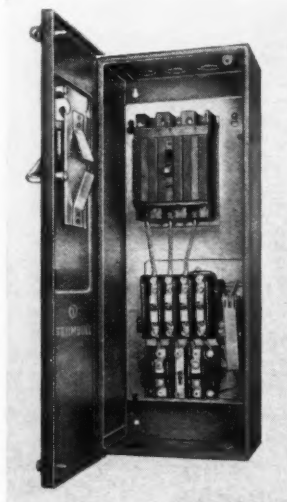
independent of external power. A self-contained hand-operated generator provides for signaling. Watertight, weather-resistant construction adapts it for service in exposed locations.

All internal parts are assembled in a sealed cast-aluminum case. The transmitter diaphragm, which is mounted in front of an aluminum cover plate, is coated with a non-corrosive moistureproof finish. A soft rubber housing incloses the receiver, the diaphragm of which also is finished to withstand corrosion. The receiver is connected with the telephone's internal mechanism through a flexible waterproof cord which enters the housing through a watertight gland.

ELECTRICAL DEVICES

An improved 60-amp. range and entrance switch (No. 2924-4), said to be compact in design and easy to wire, being finished in aluminum both inside and out, is announced by the Trumbull Electric Mfg. Co., Plainville, Conn. It is the surface type provided with a separate fuse door hinged to the front, making possible a semi-flush installation.

Combination magnetic starters and circuit breakers have



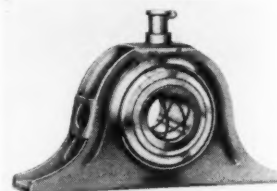
been added to the Trumbull line of industrial control. These devices are available in the range of 0-25-hp. control at 110-550 volts, a.c.

Trumbull also has introduced an improved design of Type "C" inclosed switches in 30- and 60-amp. capacities. Assembled on heavy porcelain bases, these devices are said to provide a compact design with ample wiring room.

A new design of the 60-amp. side-operated Type "D" switch is being marketed. It is being provided with individual poles on heavy porcelain equipped with wire clamps and finished in baked aluminum.

NEW PILLOW BLOCK

A new lightweight patented one-piece steel-housing pillow block is announced by the Randall Graphite Products Corporation, Chicago. It consists



of only three parts and, according to the maker, has increased oil capacity, assures full constant self-alignment, and runs quietly. Available in shaft sizes from $\frac{1}{2}$ to 1 in., it can be mounted in any position.

FLUORESCENT LAMP, REFLECTOR

New Unit-reflector type single-tube fluorescent lamp fixtures, known as the Benjamin "Flur-O-Line" lamp units, especially designed for easy and practicable attachment end-to-end or side-by-side to make it possible to build up from a number of basic unit-sections almost any size and shape of composite multiple-lamp fixtures to light large surfaces of inspection and assembly tables, as well as long production lines, have been introduced by the Benjamin Electric Mfg. Co., Des Plaines, Ill.

Each single lamp, unit-section reflector is a self-contained fixture in itself and is particularly designed with the correct type of light distribution for the numerous industrial locations requiring only a single light fixture.

The reflectors are of satin-finish polished Alzak aluminum. Cast-aluminum end plates give added rigidity to reflector assembly and prevent sagging or distortion when unit sections are gauged together. "Flur-O-Line" units are available for 18-, 24- and 36-in. lamps and can be supplied with or without auxiliaries.

Benjamin also announces the "Equalux" reflector, said to equalize illumination over a definitely restricted area. It was designed in accordance with the findings of the Illuminating Engineering Society's committee on industrial and school lighting. It utilized a large area of satinized polished Alzak aluminum so designed as to concentrate a preponderance of the light from a silver-bowl incandescent lamp over a sharply restricted area 54 in. in diameter and to provide uniformity of intensity over that area.